FINAL ENVIRONMENTAL IMPACT STATEMENT

FISHERY MANAGEMENT PLAN
PELAGIC FISHERIES OF THE WESTERN PACIFIC REGION

Prepared for

National Oceanic and Atmospheric Administration
National Marine Fisheries Service

Under contract to
Research Corporation of the University of Hawai'i

March 30, 2001

Prepared by

URS Corporation
615 Pi'ikoi Street, Suite 900
Honolulu, Hawai'i 96814

VOLUME II APPENDICES

LIST OF APPENDICES

A Order Denying Plaintiffs' Motion for Summary Judgment and Granting Defendants' Motion for Summary Judgment on Plaintiffs' Claims Under the ESA, Leatherback Sea Turtle, *et al.* vs. National Marine Fisheries Service *et al.*; Civil No. 99-00152, October 18, 1999.

B Order Setting Terms of Injunction, Center for Marine Conservation, *et al.* vs. National Marine Fisheries Service, *et al.*; Civil No. 99-00152, November 23, 1999.

C Time/Area Closure Analysis for Turtle Take Reductions (Kobayashi and Polovina Model).

D Recommendations from Dr. Larry B. Crowder on Time/Area Closure Analysis for Turtle Take Reductions.

E Recommendations from Dr. John Hampton on Time/Area Closure Analysis for Turtle Take Reductions.

F Recommendations from Dr. Michael Sissenwine on Time/Area Closure Analysis for Turtle Take Reductions.

G Estimation of Sea Turtle Take and Mortality in the Hawaiian Longline Fisheries, August 2000.

H Order Clarifying Order Modifying Provisions of Order of Injunction, Center for Marine Conservation *et al.*, vs. National Marine Fisheries Service *et al.*, Civil No. 99-00152, June 26, 2000.

I Order Further Amending Order Modifying Provisions of Order of Injunction, Center for Marine Conservation *et al.*, vs. National Marine Fisheries Service *et al.*, Civil No. 99-00152, August 4, 2000.

J Excerpts from the Magnuson-Stevens Fisheries Management and Conservation Act as Amended through October 11, 1999.

K Additional Discussion of Federal Mandates Addressed in the Fishery Management Plans.

LIST OF APPENDICES

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

L	Summary of the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region and Amendments.
M	Projected Outcomes Under the Alternatives.
N	Excerpt from the Biological Opinion for the California/Oregon Drift Gillnet Fishery, National Marine Fisheries Service, October 23, 2000.
O	Description of Methods for the Valuation of Environmental Goods.
P	Excerpt from the Biological Opinion of the U.S. Fish and Wildlife Service for the Effects of the Hawai'i-based Domestic Longline Fleet on the Short-Tailed Albatross *(Phoebastria albatrus)*, U.S. Fish and Wildlife Service, November 2000.
Q	Excerpt from the Draft Biological Opinion on the Authorization of Pelagic Fisheries under the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region, National Marine Fisheries Service, March 2001.
R	Public Comments on the Draft Environmental Impact Statement on the Pelagic Fisheries of the Western Pacific Region: Summarized Transcript of Oral Testimony Given at Public Hearings, with Responses.
S	Public Comments on the Draft Environmental Impact Statement on the Pelagic Fisheries of the Western Pacific Region: Summarized Transcription of Written Testimony Submitted to National Marine Fisheries Service, Pacific Island Area Office, During the Official Public Comment Period of December 15, 2000 to January 29, 2001, with Responses.
T	Distribution List for the Final Environmental Impact Statement on the Pelagic Fisheries of the Western Pacific Region.

[illegible] Plan for the Refuge Fisheries of the [illegible]

[illegible]

[illegible] Opinion on the [illegible] 2002

[illegible]

Errata Sheet for the Biological Opinion of the U.S. Fish and Wildlife Service for the Effects of the Federal Subsistence Management Program [illegible] U.S. Fish and Wildlife Service, November 2000

[illegible] the Draft [illegible] Opinion [illegible] Subsistence Management Plan for the Refuge Fisheries of the [illegible] March 2001

Public Comments on the Draft Environmental Impact Statement for the Refuge Fisheries of the [illegible] Subsistence Management Program [illegible]

Public Comments on the Draft Environmental Impact Statement on the Refuge Fisheries of the [illegible] Subsistence Management Program [illegible] Comment Period of December 12, 2000 to January 29, 2001 with Responses

[illegible] for the Final [illegible] Impact Statement on the Refuge Fisheries of the [illegible]

APPENDIX A

Order Denying Plaintiffs' Motion for Summary Judgment and Granting Defendants' Motion for Summary Judgment on Plaintiffs' Claims Under the ESA, Leatherback Sea Turtle, *et al.* vs. National Marine Fisheries Service *et al.*; Civil No. 99-00152, October 18, 1999.

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

LEATHERBACK SEA TURTLE; OLIVE RIDLEY SEA TURTLE; LOGGERHEAD SEA TURTLE; CENTER FOR MARINE CONSERVATION; TURTLE ISLAND RESTORATION NETWORK,

Plaintiffs,

vs.

NATIONAL MARINE FISHERIES SERVICE; NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION; UNITED STATES DEPARTMENT OF COMMERCE; WILLIAM DALEY, SECRETARY OF THE DEPARTMENT OF COMMERCE,

Defendants.

CV. NO. 99-00152 DAE

FILED IN THE
UNITED STATES DISTRICT COURT
DISTRICT OF HAWAII
OCT 18 1999
at 2 o'clock and 26 min. P M.
WALTER A.Y.H. CHINN, CLERK

ORDER DENYING PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT AND GRANTING DEFENDANTS' MOTION FOR SUMMARY JUDGMENT ON PLAINTIFFS' CLAIMS UNDER THE ESA

ORDER DENYING PLAINTIFFS' REQUEST IN THEIR MOTION FOR SUMMARY JUDGMENT ON PLAINTIFFS' SECOND CLAIM FOR RELIEF THAT AN EIS BE PREPARED BECAUSE IT IS MOOT AND GRANTING PLAINTIFFS' REQUEST FOR INJUNCTION AND GRANTING IN PART AND DENYING IN PART DEFENDANTS' MOTION FOR DISMISSAL OR, IN THE ALTERNATIVE, FOR TEMPORARY STAY OF LITIGATION OF PLAINTIFFS' SECOND CLAIM FOR RELIEF

The court heard the parties' motions on September 27, 1999. Paul H. Achitoff, Esq., appeared at the hearing on behalf of Plaintiffs; Theodore G. Meeker, Assistant United States Attorney, Lyn Jacobs, Esq., and Anthony P. Hoang, Esq., appeared at the hearing on behalf of Defendants. After reviewing the motions and the supporting and opposing memoranda, the court DENIES Plaintiffs' Motion for Summary Judgment and GRANTS Defendants' Motion for Summary Judgment on Plaintiffs' claims under the ESA. The court also DENIES Plaintiffs' request in their Motion for Summary Judgment on Plaintiffs' Second Claim f

Relief that an EIS be prepared because it is moot and GRANTS Plaintiffs' request for injunction and GRANTS in part and DENIE in part Defendants' Motion for Dismissal or, in the Alternative, for Temporary Stay of Litigation of Plaintiffs' Second Claim fo Relief.

BACKGROUND

I. Plaintiffs' First Claim for Relief

Plaintiffs, Center for Marine Conservation and Turtle Island Restoration Network, challenge the 1998 Biological Opini issued by Defendants National Marine Fisheries Service ("NMFS") and its determinations that the Hawaii Longline Fishery (the "Fishery") is not likely to jeopardize the leatherback, loggerhead, and olive ridley sea turtles. Plaintiffs also challenge the incidental take statement for these species, alleging that the take levels established are arbitrary and capricious.

On May 28, 1999, Plaintiffs filed a Motion for Summar Judgment that Defendants have violated the Administrative Procedure Act (the "APA") by failing to perform their mandatory duties under the Endangered Species Act (the "ESA"). Plaintiff seek summary judgment that (1) Defendants have violated the APA by failing to perform their mandatory duty under 16 U.S.C. § 1536(a)(1) to utilize their authority over the Fishery; (2) Defendants have violated the APA by failing to perform their mandatory duty under 16 U.S.C. § 1536(a)(2) by failing to insure that the Fishery's activities, which were authorized by Defendants, are not likely to jeopardize the continued existence of the leatherback, olive ridley, and loggerhead sea turtles; and (3) an injunction issue immediately enjoining all of the Fishery's activities authorized by the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific (the "FMP") that may adversely affect threatened or endangered turtles while Defendants reinitiate consultation under 16 U.S.C. § 1536(a)(2) concerning the Fishery's effect on these animals. (Pls.['] Notice of Mot. for Summ. J. at 2.)

On July 15, 1999, Defendants filed a response to Plaintiffs' motion and a Motion for Summary Judgment. Defendants claim that the court lacks jurisdiction over Plaintiffs' claims because Plaintiffs failed to give 60 days notice of their intent to sue. Defendants also argue that their conclusions in the 1998 Biological Opinion are rationally based, supported by the record and that they have complied with the applicable provisions of ESA and APA.

On September 9, 1999, Plaintiffs filed a reply in support of their motion for summary judgment and an opposition to Defendants' summary judgment motion filed on July 14, 1999. Defendants replied to Plaintiffs' opposition to Defendants' summary judgment motion on September 16, 1999.

II. Plaintiffs' Second Claim for Relief

On August 2, 1999, Plaintiffs filed a Motion for Summary Judgment on their Second Claim for Relief. Plaintiffs claim that Defendants violated the National Environmental Policy Act ("NEPA") and the APA by failing to prepare an Environmental Impact Statement ("EIS") and seek injunctive relief enjoining th Fishery's activities until the EIS process is complete.

On August 27, 1999, Defendants filed a Motion for Dismissal or, in the Alternative, for Temporary Stay of Litigation of Plaintiffs' Second Claim for Relief. Defendants claim Plaintiffs' second claim for relief should be dismissed fo lack of justiciability or, in the alternative, a temporary stay pending the completion by Defendants of an EIS should be granted

On September 9, 1999, Plaintiffs filed an opposition t Defendants' motion for dismissal or stay filed on August 27, 1999. Defendants replied on September 16, 1999.

III. History

The leatherback sea turtle, the olive ridley sea turtl and the loggerhead sea turtle are listed as threatened or endangered under the ESA. These turtles are not known to nest i the western United States or Hawaii, however, all species migrat through waters surrounding Hawaii. The Fishery operates in the waters surrounding Hawaii, the area through which the turtles migrate.[1] The turtles are threatened by other domestic and foreign fisheries, poaching of eggs and nesting turtles, and habitat destruction. NMFS, a federal agency, manages the Fishery under the FMP.

IV. Endangered Species Act

Under the ESA, every federal agency must, in consultation with the Secretary of Commerce through the NMFS, insure that any action authorized, funded or carried out by the agency is not likely to jeopardize the continued existence of any listed species. 16 U.S.C. § 1536 (a)(2). The ESA and its implementing regulations have set out a detailed consultation process for determining the biological impact of a proposed activity. That consultation process results in the issuance of a biological opinion in which the NMFS states whether it believes that the activity is likely to jeopardize the continued existence of a particular species and if so the NMFS must suggest reasonable and prudent alternatives. 16 U.S.C. § 1536 (b)(3)(a). If a proposed action complies with Section 7(a)(2)[2] the ESA authorizes NMFS to issue an incidental take statement that sets levels for incidental take of the species as long as there is no jeopardy to the species.

---

[1] The action area of the Fishery ranges from approximately 02°N to 48°N latitude and from 170°E to about 125°W longitude.

[2] 16 U.S.C. § 1536 (a)(2)

In this case, a biological opinion was first issued in 1985. This biological opinion, which considered the Fishery within 200 nautical miles of the United States in the central and western Pacific, concluded that the activities under the FMP would not jeopardize the turtles. Since at the time of the biological opinion there was very little information regarding the effect of the Fishery on the sea turtles, the opinion estimated incidental take[3] levels to be 50 of each species, annually, which included 25 mortality takes for each species.

A. 1991 Biological Opinion

In 1991, after a marked increase in the Fishery, the NMFS issued another biological opinion which was limited to the geographic area within which NMFS believed the Fishery operated. The NMFS issued an incidental take statement for 25 sea turtles per year with only one mortality each for the leatherback, olive ridley, or green sea turtle. Again, this opinion noted that information was still limited and concluded that the Fishery's activities were not likely to jeopardize the continued existence of the sea turtles. Also, the opinion required that all vessels submit logbooks detailing interactions with turtles in order to obtain data to better assess the effects of the Fishery.

---

[3] Under the Endangered Species Act "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. 16 U.S.C. § 1532.

B. 1993 Biological Opinion

The logbooks showed that the Fishery was operating in a much larger area than NMFS originally anticipated. Based upon this new data NMFS issued a 1993 Opinion which concluded that although the Fishery adversely affects the turtle species, the activities did not likely jeopardize the listed species over the next 12 months. The opinion increased the number of authorized takings of turtles to 752, which included a take by injury or mortality of 299 turtles. NMFS noted that because of the absence of observer-based data on incidental capture a relatively high incidental take rate was established for takes by injury or mortality for the following 12-month period during which more comprehensive information would be gathered. NMFS stated that this authorized level of take by mortality may not likely be sustained by these species on a continuing basis without the risk of jeopardizing their continued existence. The opinion also recommended an amendment to the FMP to preclude increases in longline effort until take of turtles could be managed at a level that would not preclude recovery of the turtle species. In order to obtain more data, NMFS implemented an observer program in which an NMFS observer accompanies a longline fisherman and then compiles and evaluates data.

C. 1994 Biological Opinion

NMFS issued another opinion in 1994 increasing the incidental takes from 752 takes annually to 849, which included 129 takes by mortality. NMFS based this estimate on the data gathered from the logbooks and observer programs, the most recen information on sea turtle biology, information from a sea turtle mortality workshop, and handling/resuscitation methods for incidentally caught turtles. NMFS also determined it should conduct research to determine which gear designs and fishing techniques would minimize the incidental take and mortality of the sea turtles.

D. 1998 Biological Opinion

NMFS issued a biological opinion in 1998, which is the basis for Plaintiffs' first claim for relief. That opinion concluded that the continued operation of the Fishery for 1998 through 2001 and the established incidental take levels totaling 955 are not likely to jeopardize the continued existence and recovery of the sea turtles. NMFS based its conclusions on observer reports, stranding reports, field camp reports, simulation modeling of the Fishery's impact on select stocks of affected sea turtles, and the effect of the proposed activity in concert with all other actions and activities that affect the recovery and conservation of the sea turtle population.[4]

Estimates of take were calculated for each species by using observer data and vessel logbook data collected from 1994 to 1997, the best information available, and summing the observe takes with the takes estimated from un-observed trips through the use of a statistical model, regression tree analysis.

---

[4] NMFS considered impacts of other fisheries such as the California Gillnet Fisheries, North Pacific Driftnet Fisheries and Chilean Fisheries. NMFS also considered mortality of sea turtles on the nesting beaches.

Defendants used a TURTISM model through which they could estimate how much human-induced mortality could be sustained by the stages of turtles affected by the Fishery, assuming no human-induced mortality occurred in other life stages, while still allowing each population to recover to 75% of its estimated abundance.

NMFS set the total incidental take level at 955 turtles which included a total incidental take by mortality of 194 turtles. Included in the total incidental take by mortality is the allowed incidental mortality level of the leatherback sea turtle which was set at 19 leatherbacks. Defendants used TURTISM to estimate the effect of the Fishery on just the leatherback population, the most imperiled of the three species. Based upon an estimated Pacific-wide population of late-juvenile, sub-adult and adult leatherbacks (those sizes observed in the Fishery) and an estimated average annual mortality in the Fishery of 10 leatherbacks, Defendants concluded that the Fishery inflicted a mortality of about 0.01% of the vulnerable population per year. The TURTISM simulations indicated that this represented less than 1% of the total incidental fishing mortality rate which could be sustained by the leatherback population and still allow it to recover to 75% of its pristine abundance, assuming no human-induced mortality at other life stages.[5]

Defendants did additional TURTISM studies on individual leatherback populations originating from Malaysia and Mexico. In these scenarios, the Fishery's effect was maximized by setting the mortality level in 1997 at 16 leatherbacks (the upper 95% confidence limit), and not 10 as done above. The additional studies also assumed that all 16 mortalities were from the specific leatherback population under study. This represented the upper 95% confidence limit of total leatherback mortality caused by the Fishery during that year, and not the actual incidental mortality of 10 leatherbacks. Defendants state that by assuming an incidental mortality rate of 16 leatherbacks all from one nesting population, the TURTISM analysis was based on a worst case scenario. This is because there was a low probability that the higher rate of mortality would actually occur since evidence shows that leatherbacks taken by the Fishery originate from several different nesting populations and not just one. Thus, Defendants expanded the number of incidental mortality takes to 19 leatherbacks. The level of 19 was computed as being within the average upper 95% confidence limit for annual leatherback mortality during 1994 to 1997.

---

[5] A range of human activities may cause mortality of the sea turtles including harvest of sea turtle eggs on nesting beaches, hunting of sea turtles, degradation of nesting environment by development and entanglement in marine debris.

V. National Environmental Policy Act

Under NEPA, a federal agency must prepare an environmental analysis known as an Environmental Assessment ("EA") or an Environmental Impact Statement ("EIS") when the agency is contemplating actions with significant effects on the human environment.

A. Environmental Assessments

Since 1985, Defendants have prepared Environmental Assessments evaluating the Fishery's impact on the sea turtles. The FMP was amended several times, changing or restricting the Fishery's activities. Defendants prepared an EA for each of the first through sixth amendments to the FMP. Each EA issued a Finding of No Significant Impact ("FONSI").

B. Environmental Impact Statement

In 1993, Defendants issued a draft EIS which reviewed the impact of a proposed Amendment number 7 to the FMP. After a period of public comment, Defendants issued a final EIS and attached their 1993 Biological Opinion to the final EIS.

STANDARD OF REVIEW

Rule 56(c) provides that summary judgment shall be entered when:

> [T]he pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue of material fact and that the moving party is entitled to judgment as a matter of law.

Fed. R. Civ. P. 56(c). The moving party has the initial burden of demonstrating for the court that there is no genuine issue of material fact. Celotex Corp. v. Catrett, 477 U.S. 317, 323 (1986) (citing Adickes v. S.H. Kress & Co., 398 U.S. 144 (1970)). However, the moving party need not produce evidence negating the existence of an element for which the opposing party will bear the burden of proof at trial. Id. at 322.

Once the movant has met its burden, the opposing party has the affirmative burden of coming forward with specific facts evidencing a need for trial. Fed. R. Civ. P. 56(e). The opposing party cannot stand on its pleadings, nor simply assert that it will be able to discredit the movant's evidence at trial. See T.W. Elec. Serv., Inc. v. Pacific Elec. Contractors Ass'n, 809 F.2d 626, 630 (9th Cir. 1987); Fed. R. Civ. P. 56(e). There is no genuine issue of fact "where the record taken as a whole could not lead a rational trier of fact to find for the nonmoving party." Matsushita Electric Indus. Co., Ltd. v. Zenith Radio Corp., 475 U.S. 574, 586-87 (1986) (citation omitted).

A material fact is one that may affect the decision, so that the finding of that fact is relevant and necessary to the proceedings. Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 248 (1986). A genuine issue is shown to exist if sufficient evidence is presented such that a reasonable fact finder could decide the question in favor of the nonmoving party. Id. The evidence submitted by the nonmovant, in opposition to a motion for summary judgment, "is to be believed, and all justifiable inferences are to be drawn in [its] favor." Id. at 255. In ruling on a motion for summary judgment, the court must bear in mind the actual quantum and quality of proof necessary to support liability under the applicable law. Id. at 254. The court must assess the adequacy of the nonmovant's response and must determine whether the showing the nonmovant asserts it will make at trial would be sufficient to carry its burden of proof. See Celotex, 477 U.S. at 322.

At the summary judgment stage, this court may not make credibility determinations or weigh conflicting evidence. Musick v. Burke, 913 F.2d 1390, 1394 (9th Cir. 1990). The standard for determining a motion for summary judgment is the same standard used to determine a motion for directed verdict: does the evidence present a sufficient disagreement to require submission to a jury or is it so one-sided that one party must prevail as a matter of law. Id. (citation omitted).

DISCUSSION

I. Plaintiffs' First Claim for Relief

This case involves an alleged violation by Defendants of the APA by failing to perform their duties under the ESA. Specifically, whether Defendants failed to insure that the activities of the Fishery, as authorized by the Defendants, are not likely to jeopardize the existence of the leatherback, olive ridley and loggerhead sea turtles, and whether the actions of the Fishery should be enjoined.

A. Jurisdiction

Defendants claim that this court lacks jurisdiction over Plaintiffs' claims because they failed to submit the 60-day notice of intent to sue, as required by the citizen suit provision of the ESA § 1540(g)(1)(C).

Sections (1)(C) and (2)(C) of the citizen suit provision of the ESA states that

> any person may commence a civil suit on his own behalf against the Secretary where there is alleged a failure of the Secretary to perform any act or duty under section 1533 of this title which is not discretionary with the Secretary . . . . No action may be commenced under subparagraph (1)(C) of this section prior to sixty days after written notice has been given to the Secretary.

16 U.S.C. § 1540(g).

Plaintiffs argue that its claims against the NMFS challenging its implementation of ESA are not reviewable under the ESA citizen suit provision but under the APA.

In applying Bennett v. Spear, 520 U.S. 154 (1997), the court in Strahan v. Linnon, 967 F. Supp. 581 (D. Mass. 1997), found that the citizen suit provision of ESA provides no basis for challenging a biological opinion, however such claims are reviewable under the APA. In Strahan, the plaintiffs brought their suit against ten federal defendants, including the Secretary of Commerce, the United States Department of Commerce, and the NMFS. The suit alleged violations of the ESA and the APA. The plaintiffs alleged that the NMFS in its biological opinions had violated section 7 of the ESA. The court noted that in Bennett, the Supreme Court found that the plaintiffs could not challenge the adequacy of a biological opinion under the ESA because

> [Section] 1540(g)(1)(C) expressly authorizes suit against the Secretary but only to compel him to perform a nondiscretionary duty under § 1533. That provision would be superfluous--and, worse still, its careful limitation to § 1533 would be nullified--if § 1540(g)(1)(A) permitted suit against the Secretary for any "violation" of the ESA. This finding as to the ESA, however, does not preclude judicial review of the Biological Opinions on another basis. In fact, after rejecting the plaintiffs' challenge to the biological opinions under the ESA, the Supreme Court in Bennett found no one contends (and it would not be maintainable) that the causes of action against the Secretary set forth in the ESA's citizen suit provision are exclusive, supplanting those provided by the APA. The APA, by its terms, provides a right to judicial review of all "final agency action for which there is no other adequate remedy in a court." Thus, [the court found] the plaintiffs' § 1536 claims were reviewable under the APA.

Strahan 967 F. Supp. at 591 (citations omitted). See also Greenpeace v. National Marine Fisheries Service, 55 F. Supp. 2d 1248, 1258 (W.D. Wash. 1999) ("[c]hallenges to Biological Opinions issued pursuant to ESA section 7, 16 U.S.C. § 1536, are reviewed under the Administrative Procedures Act"); Pacific Northwest Generating Co-op. v. Brown, 38 F.3d 1058, 1062 (9th Cir. 1994)(plaintiffs alleged violations of section 7 of the ESA (§ 16 U.S.C. 1536) which were also characterized as violations of the APA and thus plaintiffs were entitled to bring suit under the APA).

"[A]ctions brought under the Administrative Procedures Act do not require the sixty-day notice requirement set forth in the Endangered Species Act. Therefore, failure to provide such notice does not deprive the court of jurisdiction to entertain such claims." American Rivers v. National Marine Fisheries Service, 126 F.3d 1118, 1124-1126 (9th Cir. 1997).

Here, Plaintiffs brought claims of violations of section 7 of the ESA under the APA. Since the APA does not have a 60-day notice requirement, this court has jurisdiction over Plaintiffs' first claim for relief.

B. Endangered Species Act

The Supreme Court has stated that the ESA is "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation." Tennessee Valley Auth. v. Hill, 437 U.S. 153, 180 (1978). "[E]xamination of the language, history, and structure of [ESA] indicates beyond doubt that Congress intended endangered species to be afforded the highest of priorities." Id. at 174. The ESA's stated purposes were "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved," and "to provide a program for the conservation of such . . . species." 16 U.S.C. § 1531(b). Congress expressly stated in § 2(c) that "all Federal departments and agencies shall seek to conserve endangered species and threatened species." 16 U.S.C. § 1531(c). The Act specifically defined "conserve" as "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary." 16 U.S.C. § 1532(3).

Consistent with these goals, section 7 of the ESA provides that federal agencies shall consult with the Secretary of the Interior in order to

> insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary to be critical. . . .

16 U.S.C. § 1536(a)(2). An action will "jeopardize" a species if it "reasonably would be expected . . . to reduce appreciably the likelihood of both the survival and recovery" of the species by reducing its reproduction, numbers or distribution. 50 C.F.R. § 402.02 (1991).

This court has authority under the APA to review agency actions taken under the ESA. The APA authorizes courts to "hold unlawful and set aside agency action . . . found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). However, review under this standard is narrow, and the court cannot substitute its judgment for that of the agency. This is especially true when "the challenged decision implicates substantial agency expertise." Mt. Graham Red Squirrel v. Espy, 986 F.2d 1568, 1571 (9th Cir. 1993). The "relevant inquiry is whether the agency 'considered relevant factors and articulated a rational connection between facts found and the choice[s] made.'" Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of Navy, 898 F.2d 1410 (9th Cir. 1990).

In the first claim for relief Plaintiffs challenge the NMFS' issuance of the 1998 Biological Opinion, claiming that the "no jeopardy" finding contained in the Biological Opinion is invalid. Plaintiffs advance four main arguments in support of their claim: 1) that the "no jeopardy" finding was unsupported by the Administrative Record; 2) Defendants did not properly evaluate the cumulative effects of other known actions; 3) Defendants ignored their own experts and recovery plan; and 4) Defendants violated section 7(a)(1).

C. Whether Defendants' conclusions are supported in the Administrative Record

Plaintiffs allege that NMFS' conclusion that authorizing the Fishery to take 489 loggerheads, 168 olive ridleys and 244 leatherbacks each year would not jeopardize the continued existence of these species is arbitrary and capricious because it rests upon factual assumptions which are either contrary to the record or without a basis. Defendants claim that their determination is rationally based and supported by the Administrative Record.

Plaintiffs claim that the record contains no analysis to support the conclusion that authorization of takes of the olive ridley turtles will not likely jeopardize the species.

"[An] agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). An agency action is also arbitrary when it fails "to articulate a satisfactory explanation for its action." Northern Spotted Owl v. Hodel, 716 F. Supp. 479, 482 (W.D. Wash. 1988).

Here, Defendants gathered population estimates for the olive ridley turtles derived from nesting beach surveys in Mexico, Costa Rica, Indo and Southwest Pacific. Only the Mexican population of olive ridley turtles are considered endangered while all other populations are considered threatened. From these surveys Defendants estimated that the olive ridley species is the most abundant of the sea turtles with potential for occurring within the action area of the Fishery, and are more abundant than the leatherback or loggerhead populations. Based upon the estimates from 1994 to 1997, the olive ridley turtle had a low incidental mortality take (about 28 per year) in comparison to the population abundance. Defendants had conducted analyses of the smaller populations of leatherback and loggerhead turtles and concluded that the actions of the Fishery would not jeopardize those species. Defendants thus concluded that since the Fishery's actions did not jeopardize the smaller populations of leatherback and loggerhead, the actions of the Fishery would also not jeopardize the larger population of olive ridley turtles. Furthermore, Defendants authorize a taking of only 168 olive ridley turtles, the lowest number of takings for any of the species. Defendants have considered important aspects of the problem and offered a reasonable explanation for their decision. The record does not support the allegation that Defendants acted arbitrarily.

Plaintiffs point out that the analyses used to make a "no jeopardy" determination for the leatherback turtles assumed that the Fishery would cause only 10 leatherback mortalities annually. Yet Defendants authorized 19 leatherback takes by mortality. Thus, Plaintiffs claim that since Defendants did not assess the impacts on the leatherback population for the level of mortality it actually authorized, the "no jeopardy" finding is unsupported and therefore arbitrary.

Defendants argue that their determination was well evaluated and supported by the best scientific and commercial evidence available. Defendants state that they relied upon the conservative assessments made using TURTISM simulations.

Defendants' authorized level of take arguably is supported by the Administrative Record. Defendants clearly pointed out the methods they used to reach the authorized level of take. These methods were based upon TURTISM simulations which used estimates of actual past (10) and maximized past (16) takings. The TURTISM simulation found that the Fishery inflicted mortality represented less than 1% of the total incidental fishing mortality rate which could be sustained by the leatherback population and still allow it to recover to 75% of its abundance. Based upon the finding that the turtles could withstand a higher percentage of takes, Defendants authorized a level of take of 19, an increase of three. The mortality level estimated for the Fishery are far less than those which could be sustained by the turtle populations in absence of other human impacts while allowing the turtles to recover. Thus, Defendants did not act arbitrarily by not assessing the impact on the leatherback for the exact level of mortality it authorized, since they used the best evidence available and provided a satisfactory explanation for why they authorized a higher level of take.

D. Whether Defendants considered cumulative effects

Plaintiffs contend basing a "no jeopardy" finding on the TURTISM projections of future turtle population is arbitrary and capricious because the TURTISM method did not consider the cumulative effects of other actions on the turtle population. Plaintiffs claim that the projections are premised on false assumptions because it assumed that in each scenario all other human-induced mortalities, such as the mortality caused by other fisheries or the poaching of eggs and nesting turtles, were eliminated from 1998 onwards.

Defendants state that the purpose of TURTISM analyses is to determine the impact of the Fishery itself on the sea turtles. If Defendants had included the other human-induced mortalities, then the proportional impact of the Fishery on the sea turtles would be reduced. By eliminating other human-induced mortalities from the TURTISM analyses, the Defendants could assess the worst case scenario of the Fishery's impact on the turtles. This evaluation is the most conservative approach to determine whether the impact of the Fishery would cause jeopardy

Plaintiffs next argue that although Defendants described activities that have cumulative effects on the sea turtles, Defendants failed to actually analyze whether the combinations of these cumulative effects jeopardize the sea turtles.

Defendants claim that once the impact of the Fishery was determined using the TURTISM model, the 1998 Opinion sets forth extensive discussion and evaluation of the mortalities tha the sea turtles will face throughout the Pacific. Defendants state that the opinion considered mortalities from the Hawaii fishery, California fisheries, and known data from the Southwest Asia and Eastern Pacific fisheries. Defendants also claim that the evaluation of cumulative effects are limited by definition t actions that are reasonably certain to occur within the action area. Defendants state that the action area does not include th entire Pacific Rim.

NMFS' responsibilities include evaluating the effects of the action and cumulative effects on the listed species and formulating its biological opinion as to whether the action, taken together with cumulative effects, is likely to jeopardize the continued existence of listed species. 50 C.F.R. § 402.14. The regulations define "effects of the action" as the project's immediate impacts on the species and those impacts that are reasonably certain to occur in the future. Sierra Club v. Marsh, 816 F.2d 1376, 1387 (9th Cir. 1987).

Cumulative effects are "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." 50 C.F.R. § 402.02. As defined in the regulations, "effects of the action" does not include "cumulative effects." The agency must first consider effects of the action then cumulative effects in evaluating the threat to the species.

Here, Defendants analyzed the effects of the Fishery's action through their TURTISM simulation which considered only the Fishery's impact on the turtles and not other human-induced mortality. By doing this, Defendants were able to assess the effects of the action in isolation without reducing the Fishery's effects by including other human-induced mortality. Once Defendants knew the "effects of the action," Defendants appropriately considered the cumulative effects, such as other human-induced mortality, in conjunction with the effects of the action. Thus, this court finds that Defendants did not act arbitrarily in making their "no jeopardy" opinion since they took the correct steps in the appropriate order and considered both the Fishery's impact alone and in conjunction with the cumulative effects.

E. Whether Defendants ignored their scientists and Recover Plan

Plaintiffs claim that Defendants ignored the advice o their scientists throughout the last several years, specificall comments made by the scientists in the 1993 Biological Opinion. Plaintiffs state that scientists urged that research on ways to reduce turtle capture be a high priority and suggested several specific measures. However, the record does not show that such methods were implemented. Plaintiffs also state that Defendant were aware that the number of leatherback turtles were declinin Plaintiffs further point out that the 1993 Opinion stated that the annual takes may not likely be sustained by the species on continuing bases without risk of jeopardizing their existence, yet Defendants increased the number of authorized takes. Finally, Plaintiffs claim that Defendants did not take action because other fisheries were also responsible for turtle deaths.

Defendants claim information available or relied upon in determining the past Biological Opinions is irrelevant becaus the judicial review is based upon the 1998 Biological Opinion an the Administrative Record that allegedly supports the decision making process.

In Idaho Dep't of Fish & Game v. National Marine Fisheries Serv., 56 F.3d 1071, (9th Cir. 1995), the court held that the issuance of the 1995 Biological Opinion mooted the challenge to the 1993 Biological Opinion. Id. at 1075. In Strahan v. Linnon, 967 F. Supp. 581, 589-590 (D. Mass. 1997), th court found that the biological opinion was superseded by the

1995 Biological Opinion and therefore, any challenge to the 1994-1998 Biological Opinion was moot.

Here, the previous biological opinions have been superceded by the 1998 Biological Opinion and are therefore moot. The advice of Defendants' scientists came at a time when little data was available. Since that time Defendants have increased the amount of research, studies and analytical methods to make a more accurate assessment of the impact of the Fishery on the sea turtles. Also, Plaintiffs have not pointed to any current opinion of Defendants' scientists which conflict with the NMFS' conclusions.

Moreover, Defendants are required to rely on best scientific and commercial data available. 16 U.S.C. § 1536(a)(2). Here, as uncontested by Plaintiffs, Defendants base their 1998 Biological Opinion on the best data currently available. Requiring Defendants to consider statements made at a time when little data existed would fly in the face of their duty to rely on the best data available now. Thus, this court finds that Defendants were not arbitrary and capricious by not considering past statements of scientists since those statements are now of little value in light of changed circumstances and the increased the level of available data.

Plaintiffs also claim that Defendants ignored their Recovery Plan. The Defendants' recovery team stated that the leatherback is in decline, that in Hawaii the primary and only threat to the sea turtles is the Fishery and that incidental takes by commercial fisheries must be eliminated for the species to recover. Plaintiffs point out that in spite of these suggestions, Defendants not only increased the authorized number of takes but also did not impose restrictions or measures to maintain the sea turtle populations.

Defendants claim that Plaintiffs base their argument o an alleged violation of section 4 of the ESA. Defendants maintain that recovery plans are not decision documents because they are subject to agency discretion. Thus, Defendants contend this court has no jurisdiction over Plaintiffs' claim that the provisions of the recovery plan must be implemented.

The court notes that Plaintiffs do not allege any violations of section 4 of the ESA, nor do Plaintiffs request that Defendants be compelled to comply with their recovery plan. Plaintiffs refer to the recovery plan as evidence of the status of the species at issue and the recommended actions.

Defendants also argue that Plaintiffs' comparison of the 1998 Opinion with the recovery plan is not persuasive suppor to their claims because the goal and standards for each document is entirely different.

The court notes that the opinion assesses whether the proposed action will jeopardize the listed species. The recover plan goal is to delist the species. The process evaluations, an determinations for each document are in fact different. The recovery plan is a discretionary document by which scientists determine the methods needed to promote recovery of the species, it does not include a jeopardy analysis. It is not mandatory that the agency implement such suggestions. Furthermore, the recovery plan pre-dates the opinion and considers a larger area than the action area. Thus, the court finds that Defendants did not act arbitrarily by authorizing incidental takes even though the recovery plan recommended eliminating incidental takes.

F. Whether Defendants violated section 7(a)(1) of the Endangered Species Act

Plaintiffs claim that Defendants violated section 7(a)(1) by repeatedly authorizing the Fishery to take endangered species when their experts have urged elimination of incidental take and by doing nothing to halt or reverse the species' decline.

Defendants argue that section 7(a)(1) grants the Secretary significant discretion to determine how to utilize programs, does not mandate specific actions and therefore is reviewable by the Secretary and not the courts.

Defendants claim that its duties under section 7(a)(1) are not judicially reviewable because it has a substantial amount of discretion is without merit. Sierra Club v. Glickman, 156 F.3d 606 (5th Cir. 1998). "[T]he court conducting judicial review must require the agency to show that it has considered the relevant factors and followed the required procedures, but that, if the agency has done so, the court may not substitute its judgment on the merits for the agency's judgment." Id. at 617-618. Thus, Defendants' actions or lack thereof under section 7(a)(1) are reviewable by this court.

Defendants also argue that they complied with the requirements of this section because they conducted the formal consultation process under section 7(a)(2) and made conservation recommendations.

Section 7(a)(1) requires each federal agency in consultation with and with the assistance of the NMFS or the Fis and Wildlife Service to adopt programs for the conservation of endangered species. The term "conservation," means "to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to [the Act] are no longer necessary." 16 U.S.C. § 1532(3).

In Sierra Club v. Glickman, 156 F.3d at 618, the court found that the USDA could not just rely on the implementation of conservation programs which benefitted endangered species but must enter into consultation with the U.S. Fish and Wildlife Service in order to comply with section 7(a)(1).

Here, Defendants not only prepared conservation recommendations but actually initiated consultation and complete several biological opinions in accordance with section 7(a)(2).

Plaintiffs cite to Defenders of Wildlife v. Andrus, 42 F. Supp. 167, 170 (D.D.C. 1977) which states that

> it is clear from the face of the statute that the Fish and Wildlife Service, as part of Interior, must do far more than merely avoid the elimination of protected species. It must bring these species back from the brink so that they may be removed from the protected class, and it must use all methods necessary to do so.

That case involved Fish and Wildlife Service ("FWS") permitting hunting of game birds in an area where endangered species were located. The court noted that the FWS did not concern themselves with the amount, extent or nature of such killing. Furthermore, the court stated that Congress has noted that "[t]he two major causes of extinction are hunting and destruction of the natural habitat." Id. (citations omitted). Also, the plaintiffs in that case presented a substantial argument that the destruction of protected species may be considerable. The court found that the rulemaking process was not adequately focused upon the obligation of the Fish and Wildlife Service to conserve and increase the population of these species, thus the regulations were arbitrary. Id. Finally, the court noted that just because the regulation was deemed arbitrary, the court was not stating that the hunting activity must be prohibited if protected species are subject to incidental killing by inadvertent action of hunters or otherwise. Id.

Here, unlike the FWS in the Defenders of Wildlife case, Defendants conducted analysis into the amount of turtles killed and the effect such killing may have on the continued existence of the turtles. Defendants also issued both conservation recommendations and several biological opinions. Each biological opinion made a "no jeopardy" finding as to the incidental takings of the turtles by the Fishery. Thus, Defendants were clearly focused on their obligations under section 7(a)(1).

Furthermore, several courts have held that the agenc is not required to take affirmative steps under section 7(a)(1 For example, in Coalition for Sustainable Resources, Inc. v. United States Forest Service, 48 F. Supp. 2d 1303, 1315-1316 (Wyo. 1999) the court noted that in one case,

> the plaintiffs alleged that the defendants failed to take affirmative steps under § 7(a)(1), the [c]ourt found that the claims were without merit because that section did not require that affirmative steps be taken. See Hawksbill Sea Turtle v. FEMA, 11 F. Supp. 2d 529, 542-43 (D. VI. 1998). Another district court observed that "[C]onservation plans under [Section] 7(a)(1) are voluntary measures that the federal agency has the discretion to undertake and the [ESA] does not mandate particular actions be taken by Federal Agencies to implement [Section] 7(a)(1)." Strahan v. Linnon, 967 F. Supp. 581, 596 (D. Mass. 1997); see also J.B. Ruhl, Section 7(a)(1) of the "New" Endangered Species Act: Rediscovering and Redefining the Untapped Power of Federal Agencies' Duty to Conserve Species, 25 Envtl. L. 1107, 1132 (1995). Another court has reasoned that "[r]easonable people could disagree as to the proper level of activism required by an agency under the ESA. The court will not substitute its judgment for the agency's in deciding as a general matter that the totality of defendant's actions taken to protect threatened and endangered species were insufficient." Defenders of Wildlife v. Administrator, Environmental Protection Agency, 688 F. Supp. 1334, 1352 (D. Minn. 1988), aff'd in part and rev'd in part on other grounds, 882 F.2d 1294 (8th Cir. 1989).

Thus, this court finds that Defendants did not viola section 7(a)(1).

G. Injunction

Plaintiffs claim that if Defendants violated the ESA then an injunction should extend to all of the Fishery's activities which are authorized by the Fishery Management Plan which may adversely affect any of the threatened or endangered turtles.

For the reasons stated above, the court finds that Defendants have not violated the ESA and thus Plaintiffs are not entitled to an injunction pursuant to their first claim for relief.

II. Plaintiffs' Second Claim for Relief

Plaintiffs claim that Defendants violated NEPA and the APA by authorizing the Fishery's action without preparing an adequate EIS. Plaintiffs request that Defendants be ordered to prepare an EIS and enjoin the Fishery's activities until the process is complete. Defendants note that they have begun preparing an EIS and thus maintain that Plaintiffs' claims for relief are moot.

A. History

On August 26, 1999, the day before Plaintiffs filed their motion for summary judgment, Defendants made the decision to prepare a comprehensive EIS and expect to complete it by October 1, 2001. Defendants also made the decision to prepare an EA to determine the significance of the environmental impacts of the fishing activities that are currently being conducted and will be conducted over the next two years, the period between now and when the EIS will be completed.

Defendants also decided to implement actions designed to reduce sea turtle hooking and post-hooking mortality resulting from present conduct of fishing activities under the FMP.

B. Justiciability

Defendants argue that Plaintiffs' motion for summary judgment should be denied and that Plaintiffs' second claim for relief should be dismissed or stayed for lack of justiciability since Defendants have met Plaintiffs' demands by preparing an EIS.

The jurisdiction of federal courts is defined and limited by Article III of the Constitution. The judicial power of federal courts is constitutionally restricted to "cases" and "controversies." *Flast v. Cohen*, 392 U.S. 83, 94 (1968). No justiciable controversy is presented when the question sought to be adjudicated has been mooted by subsequent developments. *Id.* at 95.

Here, Plaintiffs seek an order for Defendants to prepare an EIS. However, Defendants have voluntarily initiated the preparation of a comprehensive EIS. Thus, the portion of Plaintiffs motion for summary judgment seeking an order requirin Defendants to prepare such EIS is denied because it is moot.

Defendants also claim that by preparing an EIS, EAs fo the interim period and implementing actions to reduce sea turtle hooking and post-hooking mortality, Plaintiffs' claim for an injunction has become moot.

However, Plaintiffs' claim seeking to enjoin the Fishery's activities during the period of preparation of the EIS is not moot. There is a live case and controversy as to whether Defendants violated NEPA by not preparing an EIS earlier and whether Plaintiffs are entitled to injunction while Defendants prepare the current EIS. Furthermore, the preparation of an EA and the implementation of actions designed to reduce sea turtle hooking do not adequately address Plaintiffs' claim for injunctive relief and thus do not render that claim moot nor does it provide a sufficient reason to stay the litigation.

C. Injunction

Here, Plaintiffs are seeking summary judgment that Defendants violated NEPA and thus Plaintiffs are entitled to an injunction. Plaintiffs seek an injunction enjoining the Fishery's activities that may have any significant impact on the turtles until the agencies and the public know what harm the Fishery is doing and the alternatives that exist, and the NEPA process has run its course. (Pls.['] Mot. for Sum. J. on Pl.['s] Second Claim for Relief at 23.) In order to grant an injunction on a summary judgment motion, Plaintiffs must show that they are entitled to a permanent injunction as a matter of law. This court must therefore determine whether Plaintiffs have carried their burden of showing success of their lawsuit on the merits and significant or irreparable harm and damage. Sierra Club v. Penfold, 857 F.2d 1307, 1318 (9th Cir. 1988).

1. Success on the merits

Plaintiffs claim that Defendants violated NEPA by not issuing an EA at all when Defendants issued their 1998 Biological Opinion and Incidental Take Statement.

a. National Environmental Policy Act

> NEPA requires agencies contemplating actions with significant effects on the human environment to prepare environmental analyses. 43 U.S.C. § 4332(c). Agencies may first prepare an environmental assessment ("EA") to determine whether a proposed action would have such an effect. 40 C.F.R. § 1508.9. If the agency determines that the proposed action will not significantly affect the environment, it may publish a Finding of No Significant Impact ("FONSI") and then execute its action.

Pyramid Lake Paiute Tribe of Indians v. United States Department of the Navy, 898 F.2d 1410, 1420 (9th Cir. 1990). If the agency makes a Finding of No Significant Impact("FONSI"), no EIS need be prepared. Friends of Endangered Species v. Jantzen, 596 F. Supp. 518, 524 (N.D. CA. 1984).

The key difference between an EA/FONSI and an EIS is that the latter must consider a broad range of alternatives to the proposed federal action, while an EA can simply approve the action as proposed. Greenpeace v. National Marine Fisheries Services, 55 F. Supp. 2d 1248, 1999 WL 504770, at *6 (W.D. Wash. 1999).

b. Whether Defendants violated NEPA by not issuing an EIS when they issued their 1998 Biological Opinion

Plaintiffs claim that an EIS should have been prepared before the issuance of the 1998 Biological Opinion and its Incidental Take Statement. Defendants do not claim that an EIS or EA was prepared in conjunction with the 1998 Incidental Take Statement, nor was it apparent from the Administrative Record that such an EA or EIS was prepared at that time.

Issuance of a permit constitutes major federal action and the federal agency involved must prepare an EA and possibly an EIS before granting it. In Ramsey v. Kantor, 96 F.3d 434, 444 (9th Cir. 1996), the court concluded that the "incidental take statement in this case is functionally equivalent to a permit because the activity in question would, for all practical purposes, be prohibited but for the incidental take statement. Accordingly, we hold that the issuance of that statement constitutes major federal action for purposes of NEPA." Thus, the court required the NMFS to prepare an EA and possibly an EIS.

Here, unless Defendants issued the Incidental Take Statement, the Fishery would be in violation of section 9 of the Endangered Species Act which prohibits the taking of endangered species. 16 U.S.C. § 1538(a)(1). As in the Ramsey case, the issuance of the Incidental Take Statement is functionally equivalent to a permit and thus constitutes major federal action. Thus, Defendants were required to prepare at least an EA before granting the permit to take certain number of the endangered species.

Although Defendants prepared an EA for each amendment to the FMP, none of these EAs can supplant their duty to prepare an EA in conjunction with the 1998 Incidental Take Statement. The Incidental Take Statement was a new permit which gave permission to the Fishery to engage in actions which were different from the actions permitted by the various amendments to the FMP.

Furthermore, the last EA was prepared in 1993 which was before Defendants had sufficient information and data. Since that time the Defendants have implemented several programs and methods to better analyze the effects of the Fishery on the sea turtles. Thus, none of the previous EAs were based upon current data. Therefore, preparation of EAs in the past does not alleviate Defendants of their duty to prepare an EA when they issued the 1998 Incidental Take Statement.

This court finds that Defendants violated NEPA by not preparing an environmental assessment and thus Plaintiffs have met their burden of showing success on the merits of a violation of NEPA by not timely preparing an EIS or EA.

2. Irreparable Harm

Plaintiffs claim that the harm being caused is incalculable and thus the court must step in to prevent this harm. The population of the turtles are in serious decline. The Defendants have acknowledged that the Fishery's actions adversely affect the turtles. The Recovery Plan for the U.S. Pacific Populations of Leatherback Turtle provides that incidental catch of leatherbacks is a severe threat to the species, and to achieve recovery, incidental take of leatherbacks in the U.S. and international commercial fisheries must be reduced.

Defendants claim that Plaintiffs have not shown irreparable harm to the turtle species.

Irreparable damage is presumed when an agency fails to evaluate thoroughly the environmental impact of a proposed action. See Friends of the Earth, Inc. v. Coleman, 518 F.2d 323, 330 (9th Cir. 1975). Irreparable damage may be implied from the failure of responsible authorities to evaluate thoroughly the environmental impact of a proposed federal action. Id. The presence of strong NEPA claims gives rise to more liberal standards for granting an injunction. See Warm Springs Dam Task Force v. Gribble, 565 F.2d 549, 552 n. 2 (9th Cir. 1977).

Here, Plaintiffs have shown that the turtles are endangered or threatened, the Fishery is "taking" these endangered and threatened species and the Incidental Take Statement permitting the takings was issued without an environmental assessment. Even though Defendants issued a biological opinion under the ESA, they failed to perform their duty of preparing an EA or EIS under NEPA. Environmental assessments have different purposes from biological opinions. A "no jeopardy" finding in the biological opinion cannot be compared to a "Finding of No Significant Impact" which is what may or may not have been determined had Defendants prepared an EA. Thus, Defendants failed to thoroughly evaluate the environmental impact of the authorized incidental takes and because of this the harm to the turtles is incalculable and it appears that the turtles may suffer irreparable harm.

3. Balance

Defendants argue that irreparable injury should not be presumed and thus the court should balance the equities.

Defendants claim that an injunction of fishing activities in the longline fishery is not in the public interest.

Defendants attached to their reply the declaration of Charles Karnella, Administrator, Pacific Islands Area Office, National Marine Fisheries Service. Mr. Karnella states that an entry of injunction of the Fishery would cost the private sector about $100 Million per year. He also states that the Fishery supplies approximately 80% of the fresh pelagic fish to the Hawaii market. There are over 100 vessels in the longline fleet worth approximately $45 million. These vessels would become idle in the short term, yet maintenance and mortgage payments would persist. Approximately 500 individuals would become unemployed at the primary production level and an equivalent number at the wholesaling and retailing levels. Mr. Karnella also states that the preliminary value of domestic fishery landings in 1998 was $49 million, resulting in Honolulu's ranking at number five, in terms of value of fish, amongst all fishing ports in the United States. The landings by the pelagic longline fleet represent about 95% of the value of all landings in Honolulu.

"NEPA . . . presume[s] that an injunction should issue in an ordinary NEPA violation case. When NEPA is violated, the fundamental harm is that the decision process has been tainted by the failure to consider fully the relevant environmental facts. The most effective way to remedy the harm is to freeze the situation until the agency reconsiders properly". State of

Wisconsin v. Weinberger, 745 F.2d 412, 432-433 (7th Cir. 1984) (citations omitted).

> An injunction is the most common judicial response to a NEPA violation. The purpose of enjoining government action pending preparation of the environmental impact statement is, generally, to maintain the status quo while additional environmental data is obtained, in order to preserve the decision makers' opportunity to choose among policy alternatives.

Forelaws on Board v. Johnson, 743 F.2d 677, 685 (9th Cir. 1984) (citation omitted).

Even though issuing an injunction is the most common judicial response, there are cases where public concerns other than failure to comply with NEPA must be weighed in determining whether to grant an injunction. For example, the Ninth Circuit held that it is only in a "rare circumstance that a court may refuse to issue an injunction when it finds a NEPA violation because the policies underlying NEPA weight the scales in favor of those seeking the suspension of all action until the Act's requirements are met." Save Our Ecosystems v. Clark, 747 F.2d 1240, 1250 (9th Cir. 1984). In Alpine Lakes Protection Society v. Schlapfer, 518 F.2d 1089 (9th Cir. 1975), the Ninth Circuit held that "unusual circumstances" required the court to balance the equities in a NEPA case. Id. at 1090. The unusual circumstances in that case were that there was a risk that the tree infestation would spread to adjacent national forest lands if an injunction stopping the logging of the infested trees was granted. Thus, the court denied the injunction because the "unusual circumstances" meant more harm could occur to forest from disease than the harm suffered by the logging of the trees if the injunction was granted. *Id.* *See also* *American Motorcyclist Association v. Watt*, 714 F.2d 962 (9th Cir. 1983), (the court found more harm would result to the environment from granting the injunction than by refusing to grant it).

Here, there is no evidence that more harm would result to the environment from granting the injunction than by refusing to grant it. Defendants have not demonstrated that this case presents unusual or rare circumstances such that the injunction should not be granted. Economic injury is a harm which occurs i almost every environmental injunction case and is not the type o harm which removes this case from the ordinary NEPA violation cases.

However, Defendants have demonstrated that an injunction of all fishing activities is not in the public interest and other cases have held the court should consider suc interest and balance the equities. *See* *Weinberger*, 745 F.2d at 426 (stating that "[a]lthough the goal of NEPA is to force agencies to consider the environmental consequences of major federal actions, that goal is not to be achieved at the expense of a total disregard for countervailing public interests.").

The Supreme Court has held that "in exercising their sound discretion, courts of equity should pay particular regard for the public consequences in employing the extraordinary remed of injunction." *Weinberger v. Romero-Barcelo*, 456 U.S. 305, 312 (1982); *See also* *State ex rel. Guste v. Lee*, 635 F. Supp. 1107, 1129 (E.D. La. 1986). "If an injunction would submerge competing public values of overriding importance, NEPA does not always require that an injunction issue." Weinberger, 745 F.2d at 432.

"When a court has found that a party is in violation of NEPA, the remedy should be shaped so as to fulfill the objectives of the statute as closely as possible, consistent with the broader public interest . . . . The court should tailor its relief to fit each particular case, balancing the environmental concerns of NEPA against the larger interests of society that might be adversely affected by an overly broad injunction." Environmental Defense Fund v. Marsh, 651 F.2d 983, 1005-06 (5th Cir. 1981). Western Oil & Gas Association v. Alaska, 439 U.S. 922, (1978); Conservation Society of Southern Vermont v. Secretary of Transportation, 508 F.2d 927, 933-34 (2d Cir. 1974), vacated on other grounds, 423 U.S. 809 (1975).

Furthermore, "where plaintiff and defendant present competing claims of injury, the traditional function of equity has been to arrive at a 'nice adjustment and reconciliation' between the competing claims." Weinberger, 745 F.2d at 425 (citation omitted).

Here, because of the public interest in the Fishery, an injunction, as framed by Plaintiffs, which stops all activities of the Fishery pending completion of an EIS, cannot be justified as an appropriate remedy under the circumstances of this case. However, a carefully tailored injunction during the EIS preparation period is warranted. Given the complexity of this case, the court has given the parties an opportunity to input their suggestions on the terms of an injunction. The precise terms of the injunction will be determined by the court after input from the parties and shall be set forth in an order defining the injunction which will be filed at a later date.

III. Whether the species should be dismissed as parties

Defendants request that the named species be dismisse and stricken from the caption.

The APA entitles any person suffering legal wrong because of agency action to judicial review thereof. 5 U.S.C. § 702. The APA defines "person" as an "individual, partnership corporation, association, or public or private organization oth than an agency." 5 U.S.C. § 551(2). Federal Rule of Civil Procedure 17 speaks only to individuals, infants and incompeten persons, it does not speak to animals.

The court finds the plain language of Rule 17 and the APA do not authorize the turtles to sue. They are clearly neither a "person" as defined in the APA, nor an individual, infant or incompetent person under Rule 17.

The remaining Plaintiffs, the Center for Marine Conservation and the Turtle Island Restoration Network, are eligible to obtain the relief sought in this action regardless whether the turtles themselves remain named plaintiffs. Plaintiffs do not argue otherwise. Therefore, the court GRANTS Defendants' request to dismiss the turtles as a plaintiff in th action. Further, the court hereby orders the Leatherback Sea Turtle, Olive Ridley Sea Turtle and Loggerhead Sea Turtle names stricken from the caption. See Hawaiian Crow('Alala) v. Lujan, 906 F. Supp. 549 (D. Haw. 1991)(bird not a "person" as defined by the citizen suit provision of the ESA).

CONCLUSION

For the reasons stated above, the court DENIES Plaintiffs' Motion for Summary Judgment and GRANTS Defendants' Motion for Summary Judgment on Plaintiffs' claims under the ESA. The court also DENIES Plaintiffs' request in their Motion for Summary Judgment on Plaintiffs' Second Claim for Relief that an EIS be prepared because it is moot and GRANTS in part and DENIES in part Defendants' Motion for Dismissal or, in the Alternative, for Temporary Stay of Litigation of Plaintiffs' Second Claim for Relief.

IT IS SO ORDERED.

DATED: Honolulu, Hawaii, Oct. 18, 1999.

DAVID ALAN EZRA
CHIEF UNITED STATES DISTRICT JUDGE

Leatherback Sea Turtle, et al. vs. National Marine Fisheries Service, et al., Civil No. 99-00152 DAE; ORDER DENYING PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT AND GRANTING DEFENDANTS' MOTION FOR SUMMARY JUDGMENT ON PLAINTIFFS' CLAIMS UNDER THE ESA; ORDER DENYING PLAINTIFFS' REQUEST IN THEIR MOTION FOR SUMMARY JUDGMENT ON PLAINTIFFS' SECOND CLAIM FOR RELIEF THAT AN EIS BE PREPARED BECAUSE IT IS MOOT AND GRANTING PLAINTIFFS' REQUEST FOR INJUNCTION AND GRANTING IN PART AND DENYING IN PART DEFENDANTS' MOTION FOR DISMISSAL OR, IN THE ALTERNATIVE, FOR TEMPORARY STAY OF LITIGATION OF PLAINTIFFS' SECOND CLAIM FOR RELIEF

APPENDIX B

Order Setting Terms of Injunction, Center for Marine Conservation, *et al.* vs. National Marine Fisheries Service, *et al.*; Civil No. 99-00152, November 23, 1999.

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

ENTER FOR MARINE)
ONSERVATION; TURTLE ISLAND)
ESTORATION NETWORK;)
)
Plaintiffs,)
)
vs.)
)
ATIONAL MARINE FISHERIES)
ERVICE; NATIONAL OCEANIC AND)
TMOSPHERIC ADMINISTRATION;)
NITED STATES DEPARTMENT OF)
OMMERCE; WILLIAM DALEY,)
ECRETARY, OF THE DEPARTMENT)
F COMMERCE)
)
Defendants.)

CV. NO. 99-00152 (DAE)

FILED IN THE
UNITED STATES DISTRICT COURT
DISTRICT OF HAWAII

NOV 2 3 1999

at 9 o'clock and 15 min. A M.
WALTER A. Y. H. CHINN, CLERK

ORDER SETTING TERMS OF INJUNCTION

On October 18, 1999, the court issued an order etermining that a carefully tailored injunction is warranted uring the period that the National Marine Fisheries Service "NMFS") prepares an environmental impact statement under the ational Environmental Policy Act of 1969. The court heard rguments on the terms of injunction by Plaintiffs, Defendants nd Defendant-Intervener Hawaii Longline Association on November 2, 1999. Paul Achitoff, Esq., appeared at the hearing on behalf f Plaintiffs; Anthony Hoang, Esq., appeared at the hearing on ehalf of Defendants; and Eldon V. C. Greenberg, Esq., appeared t the hearing on behalf of Defendant-Intervener.

The court recognizes that "[w]hen a court has found that a party is in violation of NEPA, the remedy should be shape so as to fulfill the objectives of the statute as closely as possible, consistent with the broader public interest . . . . Th court should tailor its relief to fit each particular case, balancing the environmental concerns of NEPA against the larger interests of society that might be adversely affected by an overly broad injunction." Environmental Defense Fund v. Marsh, 651 F.2d 983, 1005-06 (5th Cir. 1981); See Western Oil & Gas Association v. Alaska, 439 U.S. 922, (1978); Weinberger v. Romero-Barcelo, 456 U.S. 305 (1982); Save Our Ecosystems v. Clark, 747 F.2d 1240 (9th Cir. 1984); Alpine Lakes Protection Society v. Schlapfer, 518 F.2d 1089 (9th Cir. 1975); State of Wisconsin v. Weinberger, 745 F.2d 412 (7th Cir. 1984); Conservation Society of Southern Vermont v. Secretary of Transportation, 508 F.2d 927 (2d Cir. 1974), vacated on other grounds, 423 U.S. 809 (1975).

After careful review and consideration of the proposed terms of injunction submitted by each party, the supporting and opposing memoranda, scientific and other evidence, oral and written arguments, the court has drafted a carefully and narrowl tailored injunction. The court believes that under the circumstances this injunction best achieves the required balancing by providing the best possible opportunity to save the turtles, specifically the Leatherback sea turtle, while minimizing to the greatest extent possible the harm to the ongline fishery. Further, the court has provided a means by hich the parties may come back to court with new information, esearch or scientific evidence which would provide a ustification to modify this Order, either by expansion or ontraction. Thus, the court hereby orders that:

1. Within four months of the date of the entry of this rder, NMFS will require every vessel with a Hawaii Longline imited entry permit to carry and use NMFS-approved line clippers nd dip nets to disengage any hooked or entangled sea turtles ith the least harm possible to the turtles.

2. Within four months of the date of the entry of this rder, NMFS will complete plans and commence research into the ffects of several different gear modifications.

3. Within four months of the date of entry of this rder, NMFS will complete analysis of the temporal and spatial istribution of interactions between sea turtles and Hawaii-based ongline vessels to determine which time and area closures would rovide the greatest benefit to the sea turtles.

4. Within two weeks of the completion of the analysis, panel consisting of persons selected by NMFS, Plaintiffs and efendant-Intervener, will review the analysis and make ndividual recommendations to NMFS. Within two weeks of eceiving the recommendations, and based upon those ecommendations, NMFS will make the appropriate time and area losures based upon the greatest benefit to the sea turtles and

considering the costs to the Hawaii-based pelagic longline fishery.

5. Within 30 days of the date of entry of this order, NMFS shall prohibit all activities of the Hawaii Longline fishe authorized by the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region, as amended, within the area encompassed and bounded by the following description: nort of 28°N and between 168°W and 150°W.

6. Within 120 days of the date of entry of this order the parties shall report back to the court with their findings date and any recommendations for modification of this Order bas on scientific evidence.

IT IS SO ORDERED.

DATED: Honolulu, Hawaii, NOV 23 1999

DAVID ALAN EZRA
CHIEF UNITED STATES DISTRICT JUDG

Center for Marine Conservation, et al. vs. National Marine Fisheries Service, et al.; CIVIL NO. 99-00152 DAE; ORDER SETTIN TERMS OF INJUNCTION

APPENDIX C

Time/Area Closure Analysis for Turtle Take Reductions (Kobayashi and Polovina Model).

Time/Area Closure Analysis for Turtle Take Reductions

Donald R. Kobayashi & Jeffrey J. Polovina, NMFS Honolulu Laboratory
dkobayas@honlab.nmfs.hawaii.edu
Jeffrey.Polovina@noaa.gov
(Draft manuscript, 03/21/2000)

ntroduction

This report documents the steps taken at the National Marine Fisheries Service Honolulu aboratory in response to the Order issued by Chief U.S. District Court Judge David Alan Ezra, istrict of Hawaii, in the case of CMC et al. versus NMFS et al.; CIVIL NO. 99-00152; dated ovember 23, 1999, to complete an analysis of the temporal and spatial distribution of teractions between Hawaii-based longline vessels and sea turtles to determine time and area osures that would provide the greatest benefit to sea turtles. This report will also examine the redicted effects of the emergency spatial closure of the longline fishing grounds within the area orth of 28°N latitude and between 168°W and 150°W longitudes.

The Hawaii based longline fishery is a year-round, limited entry, high seas fishery rgeting various billfishes and tunas in the Central Pacific Ocean. Most fishing activity takes lace in the region bounded by 0-45°N latitude, 180°-140°W longitude (Figure 1). There were 14 active vessels making 1140 fishing trips in this fishery in 1998 (Ito & Machado, 1999). Sea rtle interactions in the Hawaii based longline fishery primarily involve four species with wide eographic ranges throughout the Eastern and Indo-West Pacific Ocean: loggerhead (*Caretta retta*), leatherback (*Dermochelys coriacea*), olive ridley (*Lepidochelys olivacea*), and green *Chelonia mydas*). Loggerheads are the most commonly encountered species, with an average nnual fleet wide take of 370 individuals over the time period 1994-1998 (Kleiber, 1999). eatherbacks, olive ridleys, and greens followed with averages of 166, 110, and 32 individuals ken per year, respectively. Leatherbacks are presently considered to be the most threatened of l of these species (Spotila et al., 1996); therefore, closures most beneficial to leatherbacks will e the focus of this report.

ethods

Previous analyses of sea turtle take in the Hawaii based longline fishery have primarily cused on overall take numbers (e.g., Kleiber, 1998), with less emphasis on take by area and/or me. The latter types of data are essential, however, towards constructing a time/area closure at will benefit sea turtles. The first objective of this report was to create a database of turtle ke structured over time and area. This was accomplished by applying predictive statistical odels to the attributes of each set of longline gear. These attributes include variables reported the mandated federal logbook such as latitude, longitude, trip-type (a 3-value index expressing e fish species targeting practice of that particular fishing trip: swordfish, tuna, or mixed), onth, and year, as well as other variables such as moon phase and satellite measured sea rface temperature (weekly 0.1 degree lat./lon. resolution MCSST) which were merged with the gbook data independently for this analysis, using exact location and date to determine the rresponding values. The statistical models for predicting turtle take were constructed from detailed observations gathered by NMFS-SWR observers, which monitor approximately 5% of the total longline fleet activity. Observers are required to tally all turtle takes, and other ancillary data. [Modeling fleet-wide turtle take from this small subset of the data is preferable to using logbook data verbatim for these controversial interactions with protected species. Earlier work has shown that logbook derived estimates of turtle take account for only about 9% of the total take; i.e., there are about 11 times more turtles being taken than logbook data alone would indicate (Dinardo, 1993).] It should be pointed out that not all turtles that are "taken" are dead or will necessarily die later. The kill rates (kills per take) vary by species with loggerhead, leatherback, olive ridley, and green having estimated values of 0.18, 0.07, 0.34, and 0.01, respectively, averaged over 1994-1998 (including turtles already dead and turtles expected to die later from hooking injuries; Kleiber, 1999). Fleet-wide average annual kills over the same time period were estimated to be 65, 11, 37, and 0.3, respectively. This report presents management scenario impacts in the form of a scale-free percent change which could apply to takes or kills interchangeably and, since the long term survival of hooked turtles is not well understood for all species, take rates were not adjusted with kill rate estimates.

The statistical models used are known as generalized additive models (GAM's, see Hastie & Tibshirani, 1990). GAM's differ from more conventional models in that they can easily incorporate complex nonlinear effects from multiple sources. Other commonly used models such as generalized linear models (GLM), analysis of variance (ANOVA), and multiple regressions all assume a form of linearity with the predictor variables. But if, for example, we are attempting to model the per-set take of loggerhead turtles against SST, we might *a-priori* expect that there is an optimal temperature where turtle take is high, and varying degrees of reduced take to either side of this optimum turtle habitat (see Polovina et al., 2000). Conventional linear approaches would fail to capture this effect, or could produce misleading and/or nonsensical predictions due to a forced linearization of the underlying process. Linearity remains a special case of the GAM, and can be accommodated if the data suggest such an effect. When dealing with a suite of unknown effects, a conservative or precautionary approach should include models that can handle complex nonlinear effects as well as the simpler linear effects. The nonlinear effects in a GAM are expressed as a "smoother" function of each variable, whose sum effect (hence "additive") results in the predicted value of interest; in our case species-specific per-set turtle take. There are several choices for smoother function specification in a GAM; in our application we chose to use smoothing splines since these generally perform better with regard to the bias-variance tradeoff than lowess or kernel smoothers (Trevor Hastie, pers. comm.[1]).

Turtle take GAM's were constructed using the software package S-Plus (v. 3.4) running under IRIX 6.5.4 on an SGI Challenge L workstation. All observer data (n=2812 sets) and logbook data from un-observed trips (n=55785 sets) from the years 1994-1998 were examined. A set of variables common to both the observer and logbook databases were evaluated in the GAM's: latitude, longitude, trip-type, month, year, as well as the added variables moon phase and satellite measured SST. Stepwise procedures were used to identify variables with a statistically significant contribution toward predicting turtle take. The stepwise procedure initially started out with a fully saturated model with all variables specified with smoother functions, then the model is simplified by eliminating variables or using linear functions instead of nonlinear smoother functions. The rearward stepwise approach is favored in this type of statistical model (Trevor Hastie, pers. comm.[2]). The statistical criteria used for the automated acceptance or rejection of terms in the GAM is called the Akaike Information Criterion (AIC, see Akaike, 1974), which is a goodness of fit index penalized by the number of parameters in the model. Individual GAM's were run for each turtle species: loggerhead, leatherback, olive ridley, and green. Degrees of freedom in the smoother functions were reduced manually to eliminate unnecessary curvature in the functions. The individual smoother functions for each of the final models are shown graphically in Figures 2-5. The final loggerhead GAM included smoothed nonlinear effects from latitude, longitude, moon phase, and SST; and categorical effects from each month and each year. The final leatherback GAM included smoothed nonlinear effects from latitude and moon phase, a linear effect from longitude; and categorical effects from each month. The final olive ridley GAM included a smoothed nonlinear effect from moon phase, and a linear effect from SST. The final green GAM included a linear effect from longitude, and a smoothed nonlinear effect from moon phase. These GAM's were used to make per-set take predictions across the entire logbook database using the selected variables for each turtle species. Exploratory plots summarizing turtle take by latitude, longitude, and month were created.

---

[1] Trevor Hastie, Professor of Statistics and Biostatistics, Stanford University.

The logbook database of turtle take was then examined in a series of computer simulations mimicking the effects of various protective management scenarios. Management scenarios were restricted to seasonal and spatial closures of the longline fishing grounds. Seasonal closures consisted of single month and adjacent multi-month closures spanning all possible combinations from 1-11 months in duration. Spatial closures consisted of latitudinal closures (i.e., "no fishing north of…"), longitudinal closures (i.e., "no fishing east of…"), and box closures, which combined the characteristics of a latitudinal closure and a longitudinal closure. These constraints on fishing effort were chosen due to the predominantly northward and westward distributions of leatherback turtle take, and the orientation of the fishing grounds with respect to the Hawaiian island chain; hence, spatial closures were examined at the resolution of whole degrees with "north of" values ranging from 20°N-40°N latitudes and "east of" values ranging from 174°W-145°W longitudes. Seasonal and spatial closures were combined in two possible ways with the first being a "separated" mode where the seasonal closure impacts all areas for the duration of the closed season, while the spatial closure is in effect for all time. The second type of seasonal and spatial closure combination is a "merged" mode, where the seasonal closure only applies to the spatial closure region; similarly the spatial closure is only closed for the duration of the seasonal closure. In any given management action simulation, fishing effort, fish catch, fish catch revenue, and turtle take of all species were tabulated for two ways, the first being the "static" mode where the fishing activity is assumed to not adjust after any management action, and any lost fishing effort due to a spatial and/or seasonal closures is simply obliterated from existence. In the "dynamic" mode, the fishery is assumed to respond to the closures in a predictable manner. For spatial closures, it was assumed that complete spatial reallocation of lost fishing activity would occur, and this was modeled using monthly trip-type based expansions of open-area fishing activity. For seasonal closures, it was assumed that a maximum of one month's fishing activity could be reallocated symmetrically to adjacent months bounding the seasonal closure; operationally this was approximated by allocating each lost set with a multiplier of 0.5/(number of closed months) to each bounding month. For this report, all years of data were combined to provide an average historical effect of a given management scenario.

---

[2] Trevor Hastie, Professor of Statistics and Biostatistics, Stanford University.

It should be noted that reallocation is based upon existing fishing patterns and this leads to several important points: 1) reallocation could possibly *not* occur, if there were no entries in the appropriate month-trip-type-area strata, 2) unfished month-trip-type-area strata will remain unfished, i.e., we do not account for possible expansion of the fishing grounds, and 3) management mechanisms currently in place and reflected in the data are accounted for in the reallocation, i.e., protective influences of the existing 50 nautical mile longline closures around the Northwestern Hawaiian Islands are retained, and all predicted changes from *status-quo* are considered as supplemental to existing effects.

Fish catch revenue impacts of each closure scenario were calculated based upon the values of individual fish kept or lost due to the closure. These data were made available from recent economic analyses of the longline fishery (Sam Pooley, pers. comm.[3]). Ex-vessel prices ($ / pound) and values ($ / fish) were calculated for all major species by month and trip-type (broadbill, mixed, tuna) for the 1998 fishing year by merging the NMFS sample of wholesale market prices with trips identified in the NMFS logbook reports for 1998. These values were applied to estimated catches in each time-area strata to estimate ex-vessel revenues. The NMFS wholesale sample was roughly 30-35% of all longline transactions in 1998. Previous analysis has shown consistency with the HDAR longline price reports for recent years. Where no data were available for a species-month-trip-type strata, extrapolations for that month and species were used, weighted by annual average differences between trip-types. Economic values by area (1-degree square) were not available in time for the time-area analysis. While there are systematic differences in economic values by area, preliminary analysis of revenue by latitude did not indicate substantial differences between using aggregated and disaggregated price and value data. Economic values over time (e.g., 1994-98) were also unavailable. Again, however, preliminary comparison of 1998 with the 1994-98 average values did not show substantial differences in aggregate effects (although values for individual species may have varied substantially, these were usually smoothed when taking all species into account).

After accounting for all possible combinations of seasonal and spatial closures under separated, merged, static, and dynamic modes; a total of 361,194 possible management scenarios were evaluated. Evaluation was based on several important criteria such as percent change in turtle take by species or in aggregate, percent of fishing activity (longline gear sets) disrupted by the management action (i.e., static), percent of fishing activity lost after reallocation (i.e., dynamic), and percent change in fish catch revenue. For simplicity all scenarios were firstly partitioned into bins (e.g., 0-5%, 5%-10%, 10%-15%, etc.) based upon values of the dynamic percent change in leatherback turtle take, since this appears to be the primary species of concern for protective measures. Within these bins of leatherback take, the results were further sorted to discover optimal scenarios based on the criteria mentioned above, particularly the static value of fishing effort impact. This value of fishing effort disruption is an attractive criterion for gauging the impact of a time/area closure because it makes no assumptions about reallocation of lost fishing effort and is, therefore, useful in comparing different types of closure scenarios. We feel that fishing effort disrupted by the closure provides a basic measure of the impact of the closure because it provides a measure of the fraction of the effort which is impacted by the closure but stops short of making further assumptions about how the fleet responds to that disruption and the economic impacts of this hypothetical response. Our economist, Region staff, and some industry members are not confident that we can model the fleet response and resulting economics with sufficient accuracy to use it as the basis to optimize the best closures. Several multi-criteria optimizations were also attempted, such as simply summing static percent fishing activity lost and dynamic percent fishing activity lost to form a sum of percents. This particular optimization would search for a scenario with a minimal combined effect of disruption of fishing activity and net loss of fishing activity after adjustment to a seasonal and/or spatial closure. Another multi-criteria optimization summed the individual turtle species' take change together. This optimization would search for a scenario that best reduced the take of all turtle species, in an equally weighted fashion. A larger multi-criteria optimization was formed by appropriately combining the two previously mentioned optimizations while paying close attention to arithmetic sign, so that the final criterion can both minimize disruption/loss while maximizing aggregate take reduction. For a given optimization, there were often many scenarios that nearly equally well met the optimization criteria, even at the resolution of whole degrees of latitude/longitude and whole months of time. The output from these exercises is lengthy, and it is difficult to pick a clearly superior solution for a given optimization. Scenarios that differ in only a few percentage points are probably not significantly different from each other based upon some preliminary analyses of variability. For this reason, many scenarios should be evaluated together with additional input and criteria from fishermen, industry, and other concerned parties.

---

[3] Sam Pooley, Chief of Fishery Management & Performance Investigation, NMFS Honolulu Laboratory.

Variability was estimated by constructing 95% variability bands around the values of interest using a randomization bootstrap procedure (see Efron & Gong, 1983). In this procedure, individual longline sets in the observer database were randomly resampled with replacement to construct a new database of the same original size. The GAM's were evaluated with this new dataset, and a new fleet-wide set of predicted turtle takes generated. This process was repeated 100 times and the distributions of the final values were used to address variability. The nonparametric or empirical variability bands were constructed by sorting the values from low to high and using the 2.5%th and the 97.5%th values to identify the medial 95% of the distribution. This approach was used to explore variability of optimal management scenarios for leatherback turtle take.

The predicted effect of the Emergency[4] closure was examined using the same fleet-wide turtle take database. The effects on fish catch and fish catch revenue were also examined, under both static and dynamic reallocation modes. These results were compared to the results from the optimizations.

Results & Discussion

The results of this report will focus on optimal time/area closures with emphasis on leatherback turtles. The exploratory graphical analyses (Figures 6-7) indicated that April and May accounted for the highest monthly leatherback takes, with a relatively widespread spatial distribution. This is in contrast to olive ridleys and especially loggerheads, which have relatively well defined latitudinal ranges. Olive ridleys tend to be taken more in the southerly regions of the fishing grounds, while loggerheads are primarily taken in the northerly regions.

Results from all scenarios are plotted graphically in Figure 8, using leatherback turtle take on the x-axis, and fishing effort disruption on the y-axis. This method of presenting the data is very similar to the "efficient frontier", a financial concept used in Modern Portfolio Theory (Markowitz, 1991). The graph displays an envelope of points representing the hyperspace of possible outcomes. The efficient frontier is the point at which one quantity of interest is optimized at some preset value of another quantity of interest (in finance the plot would be of risk versus return). In Figure 8, fishing effort disruption is the quantity to be optimized, and the efficient frontier is the trace of points at the highest elevation for a given value of leatherback turtle take. Further examination of the management scenarios focused upon values along several of these efficient frontiers.

---

[4] David Alan Ezra, Chief U.S. District Court Judge, District of Hawaii.

The 5 best scenarios per take reduction bin for each of the 10 different types of management regimes are broken down in Figure 9 for leatherback turtle take and fishing effort disruption. This shows the performance and capability of various types of time and/or area closures. Note that, to achieve optimal solutions at high levels of turtle take reduction, separated mode combinations of seasonal and spatial closures are required. At lower levels of turtle take reduction, simpler merged mode combinations or spatial closures only may be adequate. Generally, combinations of seasonal and spatial closures provide the best solutions when targeting a particular level of turtle take reduction, at least when best is defined as having the least impact of fishing effort disruption.

The efficient frontier margin for leatherbacks, estimated with a high degree polynomial fit to 1% bin points, is shown in Figure 10. Variability along the leatherback turtle efficient frontier is shown in Figure 11, where each best scenario per 1% take bin is bootstrapped 100 times, with the medial 95% of values bounded by a variability band. This approach will allow construction of nonparametric or empirical variability bands around not only the efficient frontier, but also to any specific output for a given management scenario. Revenue values from the efficient frontier for fishing effort disruption are shown in Figure 12. Note that this plot does not show an efficient frontier since revenue was not the value under optimization (earlier attempts at this approach were unsuccessful due to unstable boundary solutions, i.e., proposing nearly 100% fishing effort disruption to inflate low sample size revenue values). This figure is presented to indicate how revenue is predicted to change for targeted levels of leatherback turtle take reduction at optimal values of fishing effort disruption. This is only revenue changes from changes in fish catch quantity and composition, and does not include potential additional costs associated with compliance to a management scenario (e.g., transit costs, loss of fishing days). Figures 13-15 show how the takes of other turtle species change along the efficient frontier for leatherback turtle take and fishing effort disruption. These are also not true efficient frontiers since the take rates for loggerhead, olive ridley, and green were not optimized. These show predicted changes in take for other turtle species along the leatherback efficient frontier with respect to optimized fishing effort disruption. Figure 13 is particularly interesting because it highlights some closures that reduce leatherback takes and also substantially reduce loggerhead takes. Specifically for the closures that reduce leatherback takes by 20-30% and by 50-60% there are some closures that also reduce loggerhead takes by 40-55% (Figure 13). Additionally, the true efficient frontiers of other turtle takes are plotted on Figures 13-15, these are easily distinguished from the above by their relative smoothness and magnitude of turtle take reductions. These scenarios, however, tend to disrupt the fishery to a greater extent (see Appendix 3).

Appendix 1 shows the best 10 results for 19 bins of leatherback turtle take reduction. The optimization criterion in these scenarios was to minimize disruption of fishing effort. Other criteria, including multi-criteria, were attempted, but until they are better refined, the simple lisruption of fishing effort appears to provide the best optimization index. Some problems with he multi-criteria optimizations included high fishing effort disruption balanced by an assumed complete spatial reallocation to a small area; this optimization needs to be constrained to ninimize disruption and loss separately, summing these two changes resulted in lost information content. The aggregated turtle take reduction optimization suffered from excessive weighting owards loggerhead solutions, since these were the most easily reduced; again, summing the take changes resulted in lost information content, a penalty function for asymmetry may be the solution. For the fishing effort disruption criterion, even this small subset of the simulation output comprises 190 management scenarios, each one worthy of consideration for a particular evel of targeted leatherback turtle take. These 190 scenarios represent the most efficient nanagement actions to consider with regard to leatherback turtle protection. It is important to present many scenarios that, while differing in only a degree of latitude or a degree of longitude or a single month, fall upon a similar location on the efficient frontier because subtle differences n management tactic may be very important from the perspective of a longline fisherman. For example, the transit time/expense for a single degree of latitude/longitude is non-trivial. If travel time increases by only a single day per trip, the net loss to a fisherman was estimated to be $4,000 per year in 1993 (Hamilton et al., 1996). The loss of a single day of fishing (i.e., approximately one longline set) per trip was estimated to incur an annual cost of $16,000.

Several scenarios from Appendix 1 will be discussed, focusing on several arbitrary eatherback take reduction bins. In sub-table #11 (50%-55%), all 10 scenarios are separated node seasonal spatial combinations, which close the months of April and May. All 10 have similar effects on fishing effort disruption as well as fishing effort loss and fish catch revenue fter reallocation. Of interest is that only the latitudinal closures allow a reduction in green urtles, and they also tend to reduce loggerheads and leatherbacks the most. In sub-table #12 55%-60%), there are several entries that produce double-digit reductions in all four turtle species while minimizing fishing effort disruption. Considering the highly different spatial and emporal patterns of take among the turtle species, it is surprising that a single closure type can be effective for all species, while still qualifying as "best" with respect to fishing effort lisruption. Several other types of separated latitudinal closures (see Appendix 1 sub-tables #5 and #6) prove to be highly effective at reducing leatherback and loggerhead turtle take simultaneously along the efficient frontier. These closures take advantage of the predictable atitudinal patterns of loggerhead turtle take.

The predicted effects of the Emergency closure are summarized in Table 1. Firstly, turtle ake effects are presented with FE, LO, LE, RI, and GR referencing changes in fishing effort, oggerhead, leatherback, olive ridley, and green sea turtle takes, respectively. The additional otations 1 and 2 refer to static and dynamic mode, respectively, i.e., without and with eallocation. Since this is a strictly spatial closure, the simulation reallocated 100% of the lisrupted fishing effort. The second table presents the fish catch effects for some of the major pecies, where SW, BI, AL, YE, and BL reference changes in swordfish, bigeye tuna, albacore una, yellowfin tuna, and bluefin tuna catch. The RE references the total fish catch revenue hange using the entire catch, including many minor species not listed in the table. The effects re broken down by year (YY) and the multi-year average (AVG) is presented at the bottom of ach table. This scenario is predicted to be somewhat detrimental to olive ridley and green urtles, while producing a relatively small protective effect for leatherback turtles, the species for vhich it was originally intended. It disrupts approximately 13% of the fishing effort with a small decrease in fish catch revenue. The Emergency closure scenario is quite distant to the efficient frontier for all species, when compared to other management scenarios found in Appendix 1 at these levels of turtle take reduction. The symbol "E" is plotted on Figures 9-10 to indicate the predicted location of the Emergency closure in comparison to the other scenarios. Appendix 2 lists 25 management scenarios that disrupt longline fishery effort to approximately the same extent as the Emergency closure, but with more effective leatherback turtle take reduction.

As this report was being finalized, another appendix was prepared which includes optimizations for other turtle species within each bin of leatherback turtle take reduction. Appendix 3 lists 3 management scenarios each for optimal loggerhead, olive ridley, and green turtle take reductions, as well as a multi-criteria index representing aggregate turtle take reduction. This index was created by summing all 4 turtle species' percent change with an asymmetry penalty defined as twice the difference between the maximum and minimum percent change. The asymmetry penalty was used to avoid solutions that were highly effective at reducing only a single turtle species. Thusly, solutions were discovered which resulted in an approximately uniform reduction in all 4 turtle species at each level of leatherback turtle take reduction. Appendix 3 shows that for any level of leatherback take reduction it is possible to find closures that also greatly reduce takes of other turtles but with a very major adverse impact to the fishery

Acknowledgements

We thank Sam Pooley for providing the data necessary to estimate revenue impacts in the time/area closure simulations, and for preparing the paragraph describing the data. Pierre Kleiber provided much appreciated assistance with S-Plus GAM analysis and database preparation. We also thank Kathy Cousins, Charles Karnella, Pierre Kleiber, Mike Laurs, Marilyn Luipold, Alec MacCall, Marti McCracken, Rod McInnis, Dick Neal, Sam Pooley, Barbara Schroeder, Mike Tillman, and Jerry Wetherall for their helpful advice and reviews of earlier drafts of this report.

iterature cited

kaike, H. 1974. A new look at statistical model identification. IEEE Transactions on utomatic Control. AU-19, 716-722.

inardo, G. T. 1993. Statistical guidelines for a pilot observer program to estimate turtle takes the Hawaii longline fishery. NOAA Technical Memorandum NMFS, NOAA-TM-NMFS-WFSC-190. 40pp.

fron, B., and G. Gong. A leisurely look at the bootstrap, the jackknife, and cross-validation. he American Statistician. 37(1): 36-48.

lamilton, M. S., R. E. Curtis, and M. D. Travis. 1996. Cost-earnings study of the Hawaii-based ongline fleet. Pelagic Fisheries Research Program report. SOEST 96-03, JIMAR Contribution 6-300.

lastie, T. J., and R. J. Tibshirani. 1990. Generalized Additive Models. CRC Press. Boca aton, FL. 336 pp.

to, R. Y., and W. A. Machado. Annual report of the Hawaii-based longline fishery for 1998. Ionolulu Laboratory, Southwest Fisheries Science Center, National Marine Fisheries Service, IOAA, Administrative Report H-99-06. 62 pp.

leiber, P. 1998 Estimating annual takes and kills of sea turtles by the Hawaiian longline ishery, 1991-97, from observer program and logbook data. Honolulu Laboratory, Southwest isheries Science Center, National Marine Fisheries Service, NOAA, Administrative Report H-8-08. 21 pp.

leiber, P. 1999. Estimated fleet-wide turtle takes and kill in the Hawaiian longline fishery, 994-1998. In: Pelagic Fisheries of the Western Pacific Region, 1998 Annual Report. Western acific Regional Fishery Management Council, Honolulu.

farkowitz, H. M. 1991. Portfolio Selection: Efficient Diversification of Investments. lackwell Publishers. Oxford, U.K. 400 pp.

olovina, J. J., D. R. Kobayashi, D. M. Ellis, M. P. Seki, and G. H. Balazs. 2000. Turtles on the dge: movement of loggerhead turtles (*Caretta caretta*) along oceanic fronts, spanning longline shing grounds in the central North Pacific, 1997-1998. Fishery Oceanography.

potila, J.R., A.E. Dunham, A.J. Leslie, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 1996. Vorldwide population decline of *Dermochelys coriacea*: Are leatherback turtles going extinct? helonian Cons. and Biol. 2(2): 209-222.

Table 1. Predicted consequences of the Emergency closure. See text for details.

YY	FE	LO1	LO2	LE1	LE2	RI1	RI2	GR1	GR2
94	-19%	-48%	-13%	-37%	-14%	-6%	6%	-10%	46%
95	-9%	-42%	-21%	-19%	-3%	-5%	1%	-8%	1%
96	-14%	-60%	-33%	-21%	-1%	-3%	6%	-13%	0%
97	-13%	-66%	-27%	-19%	-1%	-3%	2%	-11%	-0%
98	-11%	-42%	-17%	-14%	-3%	-5%	2%	-10%	-1%
AVG	-13%	-51%	-22%	-22%	-4%	-4%	3%	-11%	9%

YY	SW1	SW2	BI1	BI2	AL1	AL2	YE1	YE2	BL1	BL2	RE1	RE2
90	-4%	-0%	-1%	1%	-0%	0%	-1%	1%	0%	0%	-1%	1%
91	-49%	-18%	-16%	3%	-38%	-25%	-17%	1%	0%	0%	-33%	-6%
92	-52%	-6%	-14%	11%	-56%	-34%	-29%	-2%	0%	0%	-40%	2%
93	-42%	-9%	-15%	7%	-25%	2%	-14%	5%	0%	0%	-29%	-1%
94	-46%	-6%	-5%	2%	-21%	-2%	-6%	4%	-32%	16%	-23%	-1%
95	-25%	-5%	-4%	2%	-6%	-1%	-5%	2%	-27%	-14%	-11%	0%
96	-45%	-22%	-4%	10%	-8%	-1%	-8%	9%	-41%	-26%	-17%	1%
97	-42%	-9%	-4%	2%	-4%	0%	-6%	1%	-21%	-10%	-15%	-1%
98	-29%	-5%	-6%	1%	-5%	1%	-6%	1%	-21%	1%	-12%	-0%
99	-31%	-5%	-7%	1%	-6%	1%	-11%	-4%	-27%	-17%	-15%	-2%
AVG	-37%	-9%	-8%	4%	-17%	-6%	-10%	2%	-17%	-5%	-20%	-1%

gure captions

gure 1. Map of Hawaii based longline fishing effort (1994-1998) and location of Emergency osure.

gure 2. Smoother functions for loggerhead turtle GAM.

gure 3. Smoother functions for leatherback turtle GAM.

gure 4. Smoother functions for olive ridley turtle GAM.

gure 5. Smoother functions for green turtle GAM.

gure 6. Turtle take in the Hawaii based longline fishery by month, 1994-1998.

gure 7. Turtle take in the Hawaii based longline fishery by latitude and longitude, 1994-1998.

gure 8. All management scenarios evaluated in the leatherback turtle take reduction nulations, showing changes in turtle take and fishing effort disruption.

gure 9. Best management scenarios evaluated in the leatherback turtle take reduction nulations, broken down by type of management regime, showing changes in turtle take and hing effort disruption. The "E" denotes the predicted location of the Emergency closure.

gure 10. Polynomial representation of the efficient frontier for leatherback turtles. Points present best values per 1% bin of turtle take reduction. The "E" denotes the predicted location the Emergency closure.

gure 11. 95% variability envelope of the efficient frontier for leatherback turtle take reduction d fishing effort disruption from bootstrapping.

gure 12. Polynomial representation of the revenue frontier for leatherback turtles. This presents the changes in fish catch revenue associated with scenarios optimized with respect to hing effort disruption.

gure 13. Polynomial representations of the loggerhead turtle take frontier for leatherback rtles. This upper data represents the changes in loggerhead turtle take associated with enarios optimized with respect to fishing effort disruption. The lower data are optimized only r loggerhead turtle take reduction.

gure 14. Polynomial representations of the olive ridley turtle take frontier for leatherback rtles. The upper data represents the changes in olive ridley turtle take associated with scenarios timized with respect to fishing effort disruption. The lower data are optimized only for olive lley turtle take reduction.

gure 15. Polynomial representations of the green turtle take frontier for leatherback turtles. e upper data represents the changes in green turtle take associated with scenarios optimized with respect to fishing effort disruption. The lower data are optimized only for green turtle take reduction.

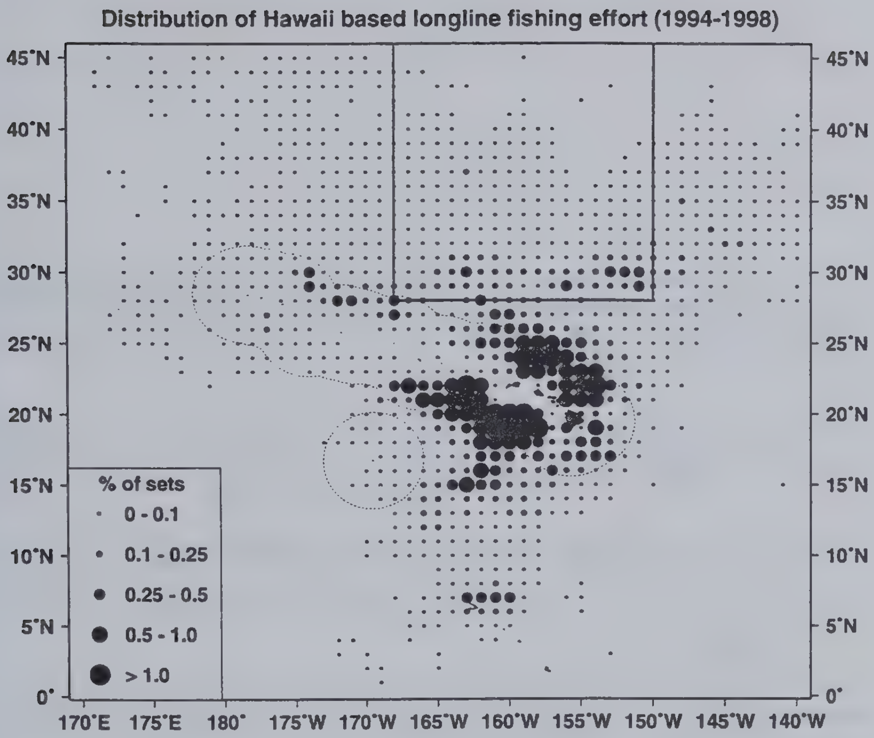

Distribution of Hawaii based longline fishing effort (1994-1998)
45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
0°
% of sets
0 - 0.1
0.1 - 0.25
0.25 - 0.5
0.5 - 1.0
> 1.0
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W

Figure 1 of 15

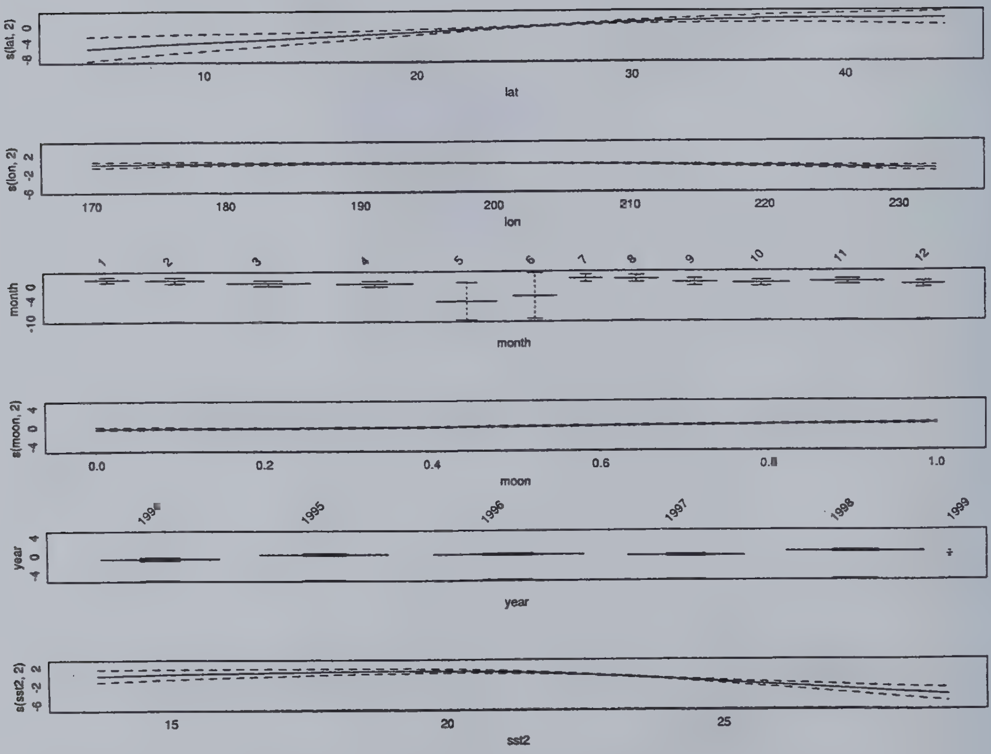


Figure 2 of 15

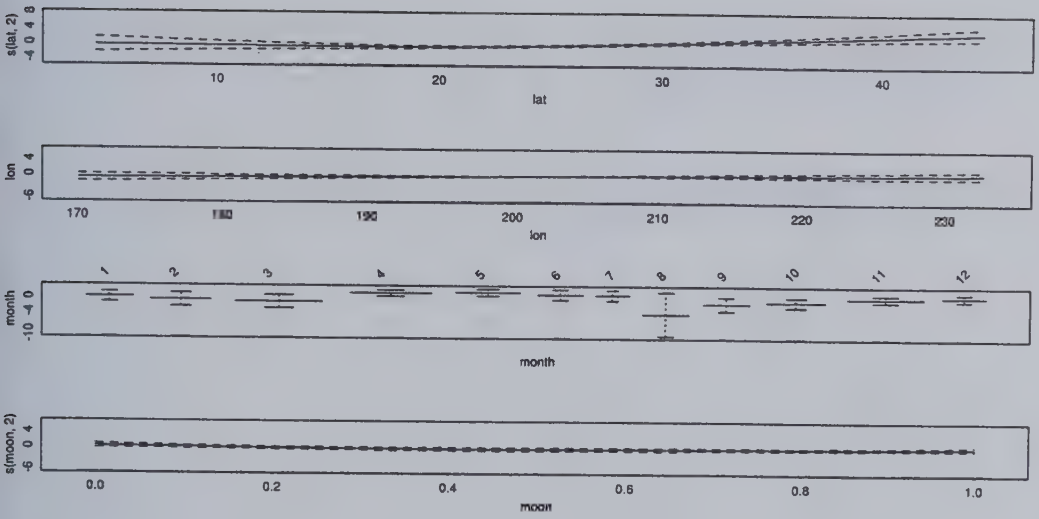


Figure 3 of 15

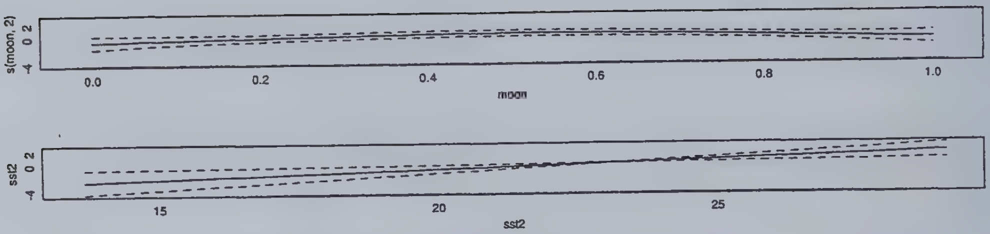


Figure 4 of 15

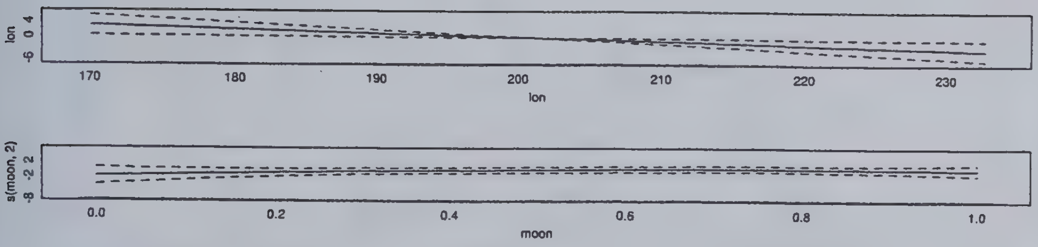


Figure 5 of 15

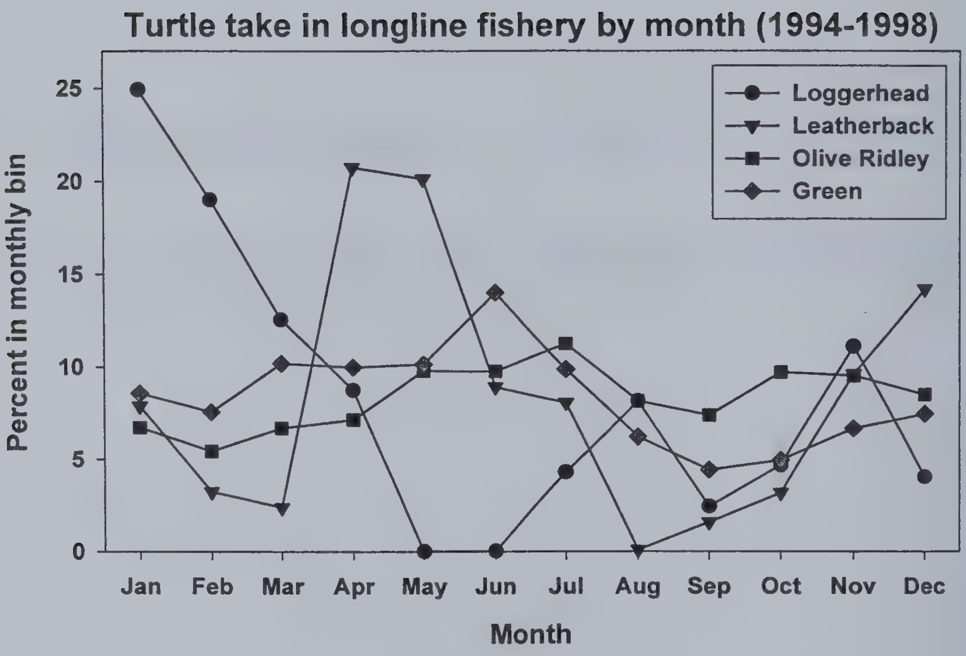
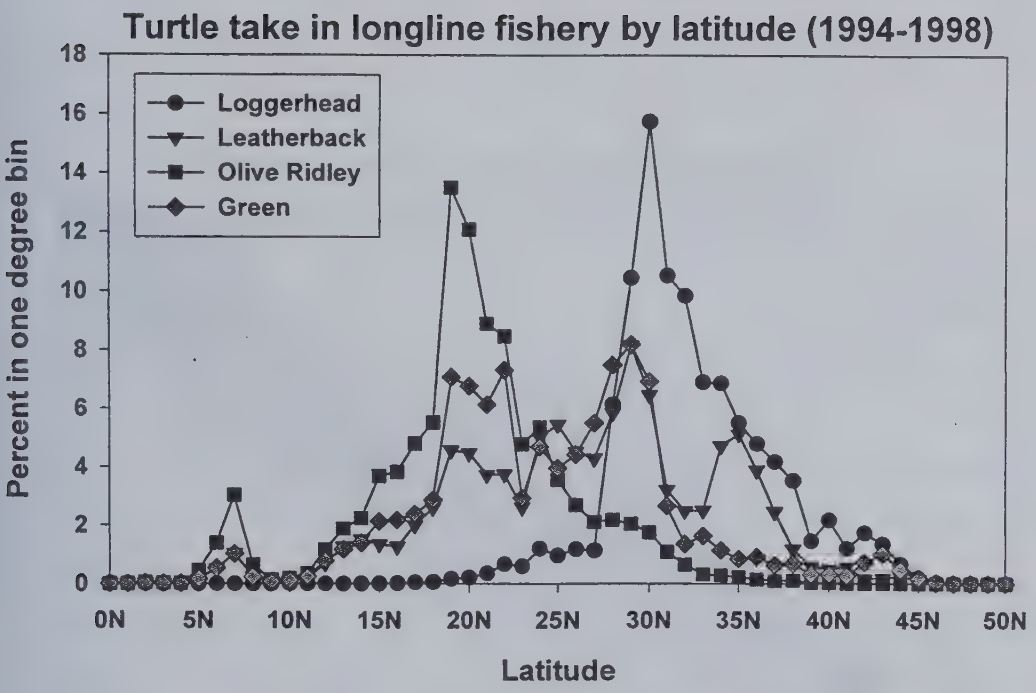


Figure 6 of 15



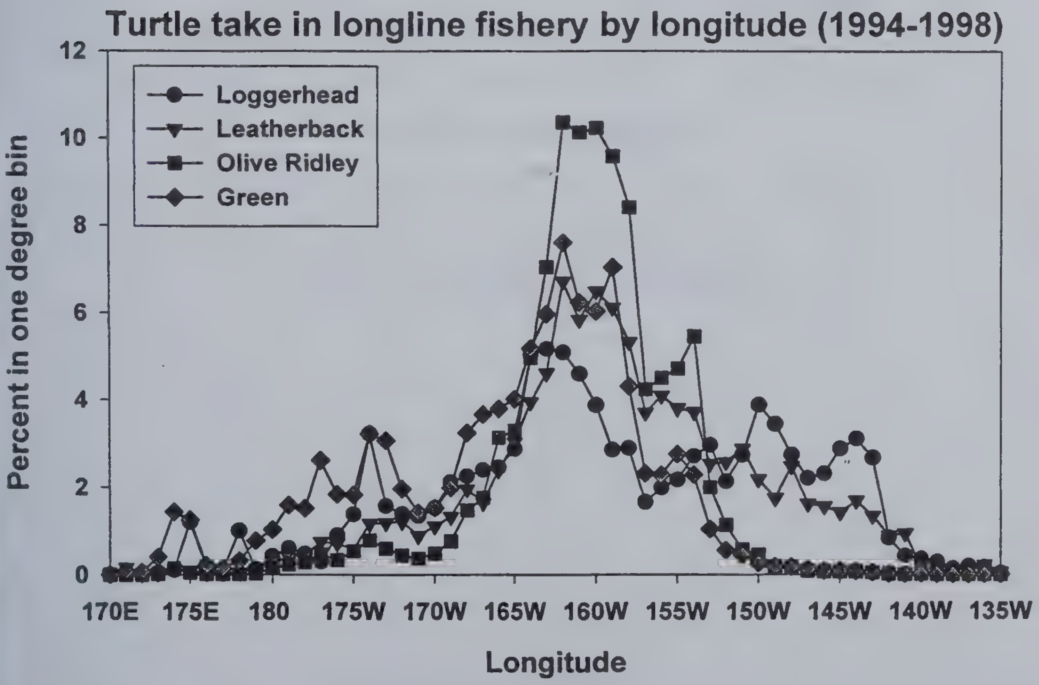


Figure 7 of 15

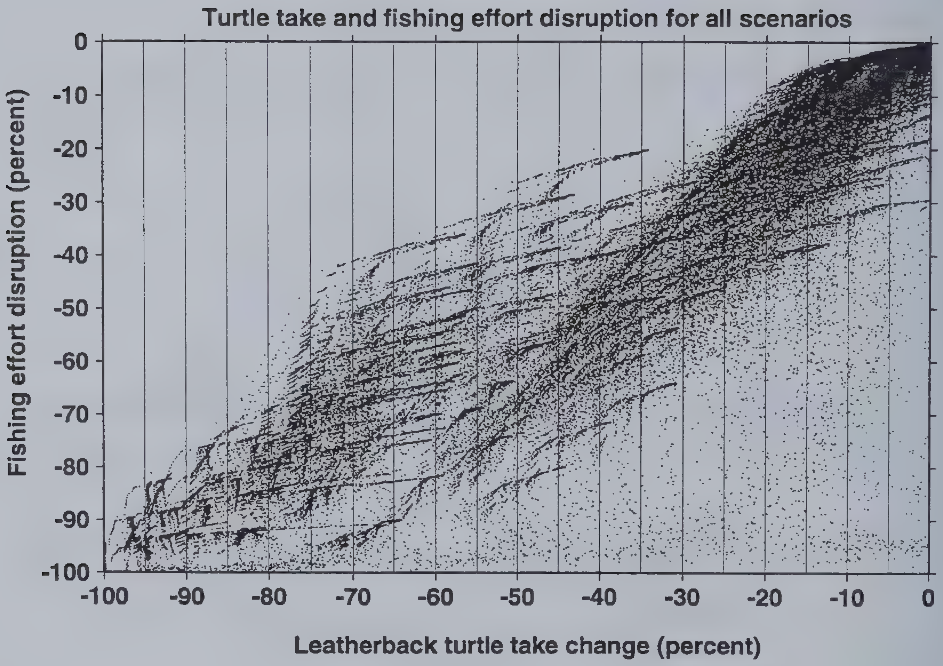


Figure 8 of 15

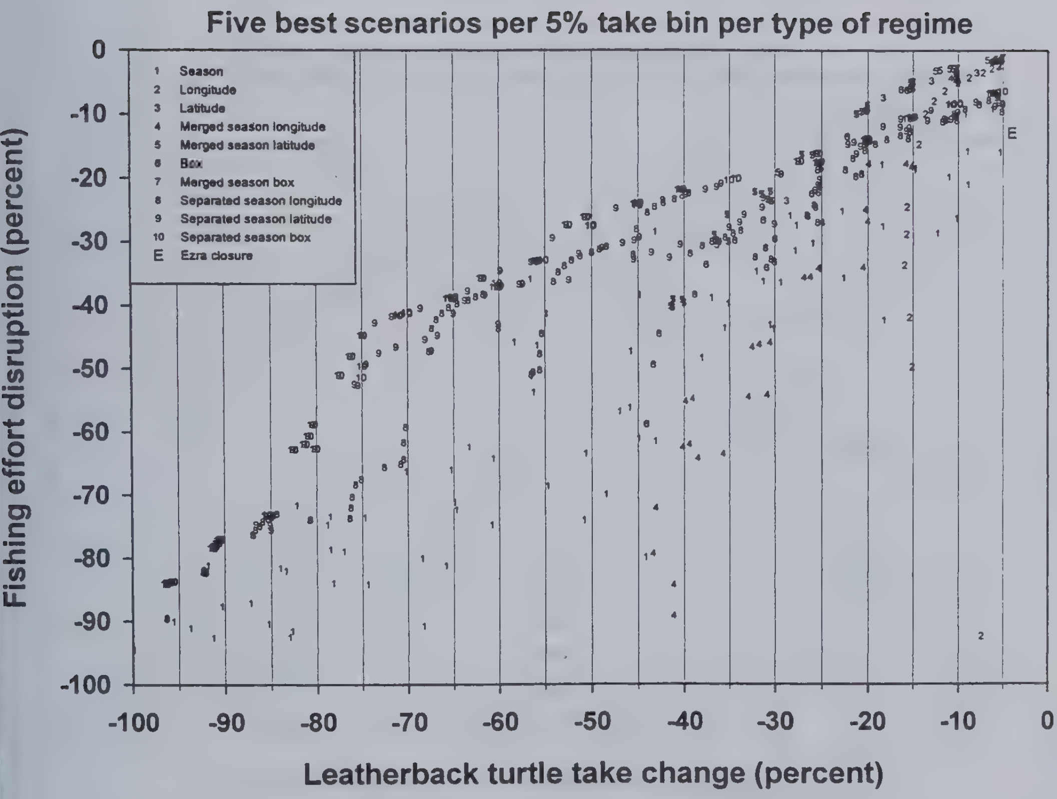


Figure 9 of 15

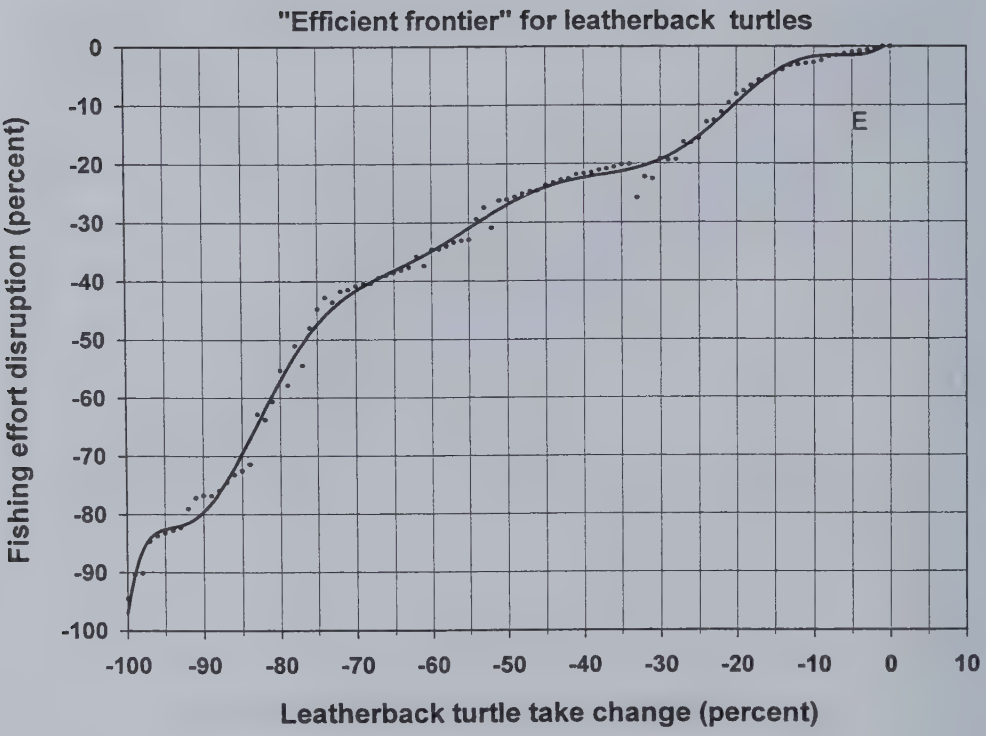


Figure 10 of 15

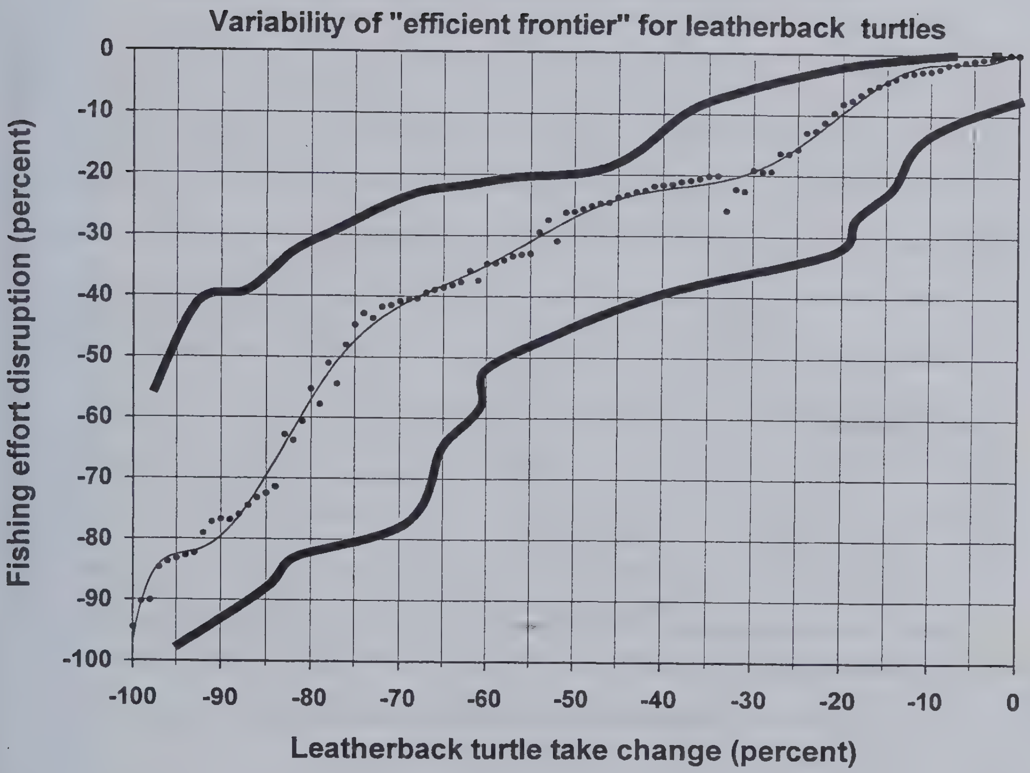


Figure 11 of 15

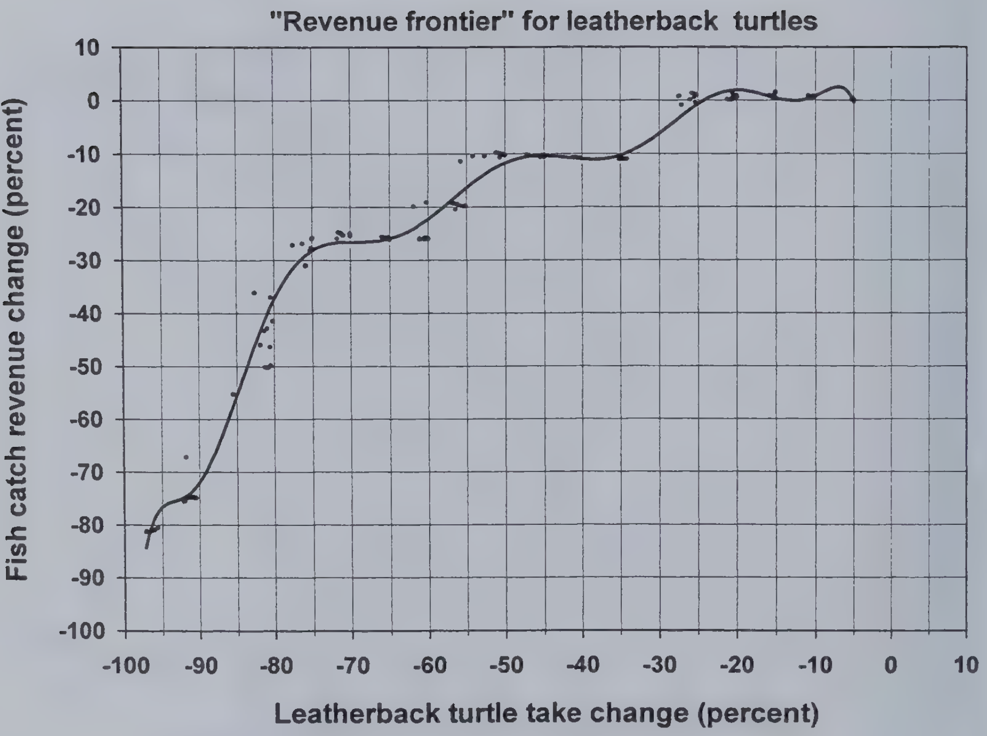


Figure 12 of 15

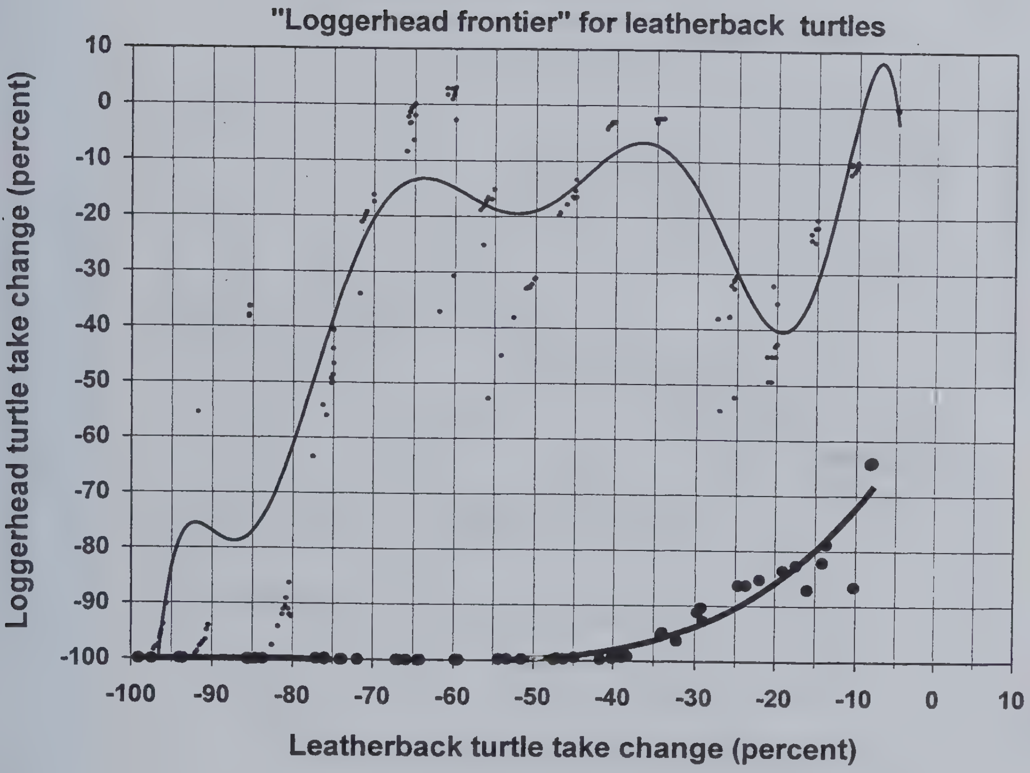


Figure 13 of 15

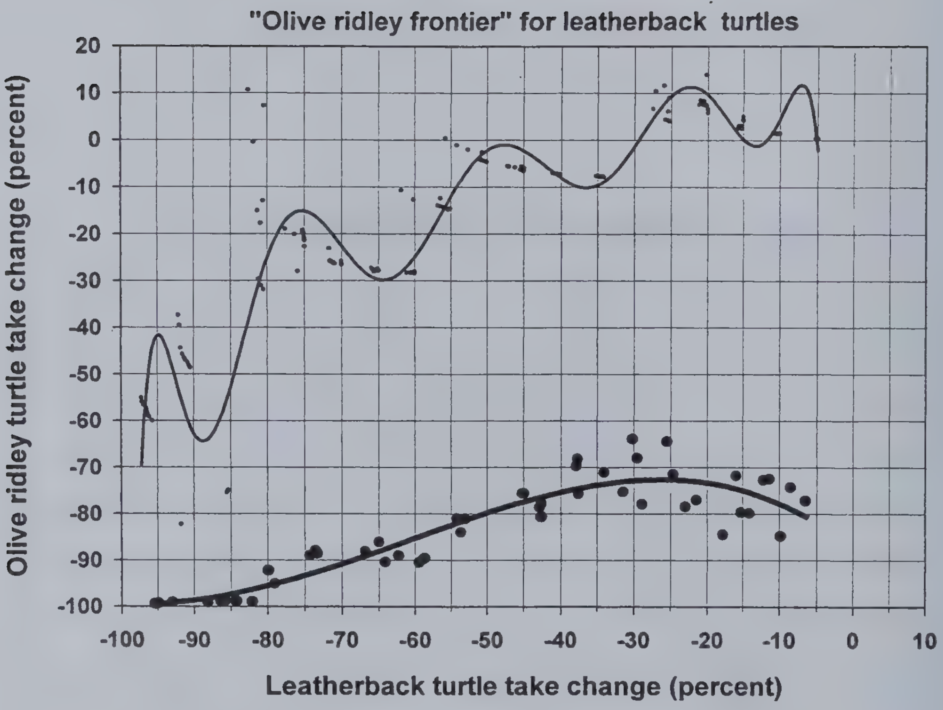


Figure 14 of 15

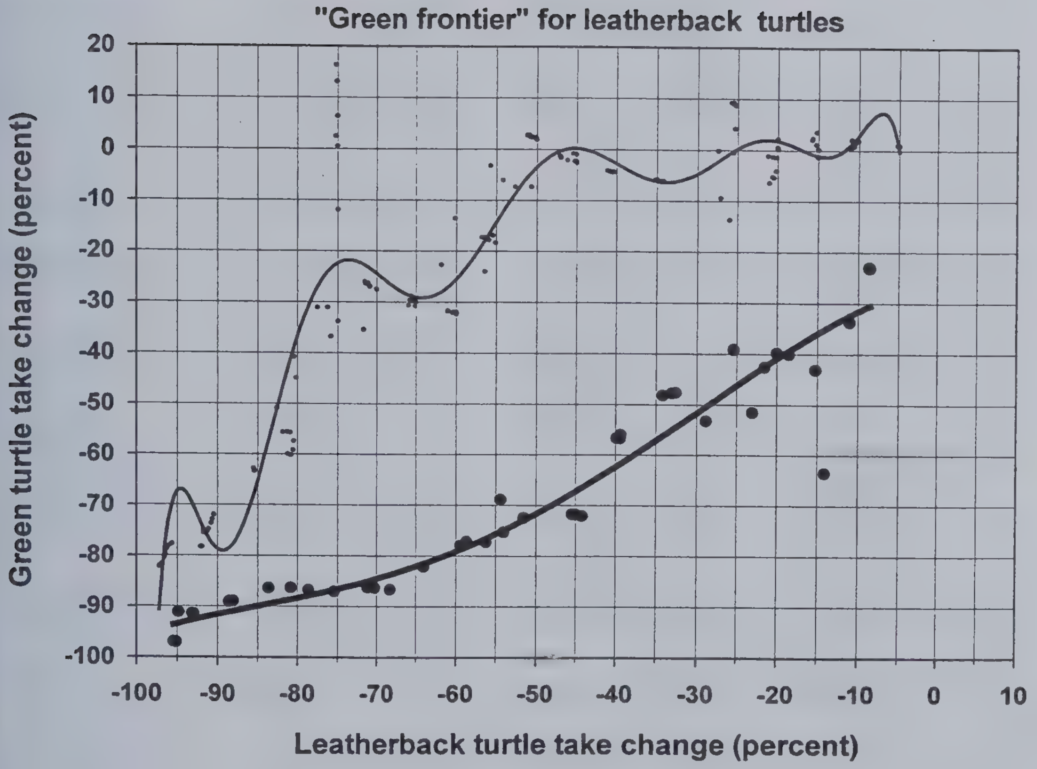


Figure 15 of 15

Appendix 1. Listings of ten best scenarios optimized for minimal fishing effort disruption per bin of leatherback turtle take reduction. Notations: #Mn = the number of months for a seasonal closure, Ms = the starting month of a seasonal closure, Lon/Lat = position of spatial closure, FED = fishing effort disruption, FEL = fishing effort lost, Rev = fish catch revenue change, Log = loggerhead turtle take change, Lea = leatherback turtle take change, Rid = olive ridley turtle take change, Gre = green turtle take change, Swo = swordfish catch change, Big = bigeye tuna catch change, Alb = albacore catch change, Yel = yellowfin tuna catch change, Blu = bluefin tuna catch change, Mah = mahi-mahi catch change, Opa = opah catch change. Other fish species included in the revenue calculations are not presented to save space. Results are not presented in any ordered sequence.

```
Leatherback turtle take reduction bin # 20 ( -95% to %-100%)
10 best of 2327 scenarios at this take level with minimum fishing effort disruption
=======================================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=======================================================================================================================================================================
Separated season latitude       9     11      28 -85.96%  -73.03%  -81.28%  -98.52%  -97.22%  -55.09%  -82.28%  -97.08%  -78.36%  -77.93%  -76.98%  -54.02%  -68.94%  -60.67%
Separated season latitude       9     11      29 -85.44%  -73.03%  -81.11%  -98.20%  -97.15%  -55.93%  -82.00%  -96.52%  -77.67%  -78.27%  -76.87%  -54.00%  -65.06%  -61.27%
Separated season latitude       9     11      30 -85.13%  -73.03%  -81.25%  -97.92%  -96.95%  -56.59%  -81.69%  -96.17%  -77.29%  -78.46%  -76.88%  -53.91%  -61.64%  -61.70%
Separated season latitude       9     11      31 -84.68%  -73.03%  -81.05%  -97.53%  -96.58%  -57.26%  -80.45%  -95.45%  -76.57%  -78.76%  -77.25%  -52.95%  -59.83%  -62.18%
Separated season latitude       9     11      32 -84.27%  -73.03%  -81.03%  -96.41%  -96.47%  -57.87%  -79.77%  -94.80%  -75.96%  -78.96%  -77.44%  -53.11%  -55.99%  -62.48%
Separated season latitude       9     11      33 -84.09%  -73.03%  -80.89%  -95.94%  -96.40%  -58.37%  -78.97%  -94.56%  -75.68%  -79.09%  -77.65%  -53.24%  -55.00%  -62.63%
Separated season latitude       9     11      34 -83.99%  -73.03%  -80.92%  -95.67%  -96.36%  -58.65%  -78.75%  -94.11%  -75.51%  -78.95%  -77.70%  -51.59%  -55.10%  -62.72%
Separated season latitude       9     11      35 -83.91%  -73.03%  -80.96%  -95.12%  -96.30%  -58.89%  -78.59%  -93.41%  -75.72%  -78.84%  -77.91%  -51.55%  -55.18%  -62.89%
Separated season latitude       9     11      36 -83.86%  -73.03%  -80.86%  -93.91%  -96.08%  -59.22%  -78.15%  -92.73%  -75.97%  -78.59%  -78.17%  -51.57%  -55.55%  -63.05%
Separated season latitude       9     11      37 -83.74%  -73.03%  -80.50%  -90.17%  -95.69%  -59.98%  -77.72%  -91.30%  -76.27%  -77.16%  -78.36%  -49.84%  -55.04%  -63.15%

Leatherback turtle take reduction bin # 19 ( -90% to -95%)
10 best of 3249 scenarios at this take level with minimum fishing effort disruption
=======================================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=======================================================================================================================================================================
Separated season latitude       8     12      25 -80.80%  -64.30%  -75.53%  -99.20%  -92.13%  -37.37%  -78.29%  -96.42%  -65.24%  -72.73%  -69.12%  -53.55%  -64.20%  -54.41%
Separated season latitude       8     12      26 -80.21%  -64.30%  -75.44%  -99.06%  -91.97%  -39.51%  -78.34%  -96.09%  -64.78%  -72.34%  -69.47%  -53.58%  -61.47%  -53.15%
Separated season latitude       8     12      27 -79.63%  -64.30%  -74.72%  -98.67%  -91.80%  -44.35%  -75.46%  -95.12%  -63.76%  -71.91%  -69.26%  -49.87%  -59.21%  -52.73%
Separated season latitude       8     12      28 -79.02%  -64.30%  -74.82%  -97.86%  -91.57%  -45.73%  -75.65%  -94.35%  -62.94%  -71.96%  -69.56%  -48.65%  -55.45%  -53.36%
Separated season latitude       8     12      29 -78.43%  -64.30%  -74.55%  -97.45%  -91.32%  -46.55%  -75.30%  -93.69%  -61.43%  -72.27%  -69.37%  -48.96%  -52.27%  -53.96%
Separated season latitude       8     12      30 -78.09%  -64.30%  -74.75%  -97.13%  -91.15%  -46.94%  -74.81%  -93.22%  -60.61%  -72.34%  -69.24%  -49.38%  -49.01%  -54.26%
Separated season latitude       8     12      31 -77.62%  -64.30%  -74.68%  -96.65%  -90.84%  -47.48%  -73.70%  -92.45%  -59.78%  -72.64%  -69.50%  -48.74%  -47.73%  -54.72%
Separated season latitude       8     12      32 -77.18%  -64.30%  -74.85%  -94.92%  -90.68%  -48.09%  -72.88%  -91.74%  -59.27%  -72.67%  -69.88%  -48.61%  -45.27%  -55.01%
Separated season latitude       8     12      33 -76.98%  -64.30%  -74.84%  -94.10%  -90.50%  -48.62%  -72.00%  -90.96%  -59.80%  -69.00%  -70.31%  -48.78%  -44.87%  -55.16%
Separated season box           10      4  162038 -81.20%  -73.08%  -67.12%  -55.50%  -91.80%  -82.24%  -74.86%  -67.93%  -73.58%  -82.16%  -71.62%  -38.80%  -75.87%  -81.26%

Leatherback turtle take reduction bin # 18 ( -85% to -90%)
10 best of 2369 scenarios at this take level with minimum fishing effort disruption
=======================================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=======================================================================================================================================================================
Separated season box            9      4  159032 -73.27%  -63.69%  -55.27%  -38.24%  -85.53%  -75.26%  -62.80%  -62.07%  -60.20%  -75.97%  -59.22%  -26.26%  -70.30%  -75.14%
Separated season box            9      4  158032 -73.27%  -63.69%  -55.26%  -38.14%  -85.52%  -75.26%  -62.80%  -62.00%  -60.21%  -75.88%  -59.25%  -26.29%  -70.30%  -75.14%
Separated season box            9      4  157032 -73.27%  -63.69%  -55.26%  -38.14%  -85.52%  -75.26%  -62.80%  -61.94%  -60.24%  -75.59%  -59.32%  -26.51%  -70.31%  -75.15%
Separated season box            9      4  156032 -73.27%  -63.69%  -55.27%  -38.14%  -85.52%  -75.26%  -62.80%  -61.92%  -60.24%  -75.58%  -59.31%  -26.51%  -70.30%  -75.15%
Separated season box            9      4  155032 -73.27%  -63.69%  -55.27%  -38.14%  -85.52%  -75.26%  -62.80%  -61.92%  -60.24%  -75.58%  -59.30%  -26.51%  -70.31%  -75.14%
Separated season box            9      4  154032 -73.26%  -63.69%  -55.27%  -38.14%  -85.52%  -75.26%  -62.80%  -61.92%  -60.25%  -75.58%  -59.31%  -26.51%  -70.31%  -75.15%
Separated season box            9      4  153032 -73.26%  -63.69%  -55.27%  -38.14%  -85.52%  -75.26%  -62.81%  -61.81%  -60.29%  -75.59%  -59.29%  -26.56%  -70.31%  -75.17%
Separated season box            9      4  152032 -73.25%  -63.69%  -55.25%  -37.97%  -85.52%  -75.27%  -62.85%  -61.79%  -60.32%  -75.63%  -59.33%  -26.96%  -70.38%  -75.20%
Separated season box            9      4  151032 -73.23%  -63.69%  -55.23%  -37.88%  -85.52%  -75.28%  -62.89%  -61.73%  -60.32%  -75.64%  -59.28%  -26.52%  -70.41%  -75.21%
Separated season box            9      4  150032 -73.13%  -63.69%  -55.21%  -36.31%  -85.39%  -74.87%  -63.31%  -61.67%  -60.34%  -75.68%  -59.33%  -25.89%  -70.46%  -75.22%

Leatherback turtle take reduction bin # 17 ( -80% to -85%)
10 best of 4485 scenarios at this take level with minimum fishing effort disruption
=======================================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=======================================================================================================================================================================
Separated season latitude       4      4      23 -62.82%  -26.95%  -36.06%  -97.58%  -82.59%   10.73%  -50.87%  -92.13%  -14.91%  -56.66%  -26.77%  -37.20%  -28.69%  -17.85%
Separated season latitude       4      4      24 -58.84%  -26.95%  -36.91%  -92.03%  -80.44%    7.33%  -40.79%  -87.62%  -12.45%  -51.53%  -23.56%  -37.38%  -14.95%  -17.33%
Separated season latitude       5      3      24 -63.77%  -36.70%  -45.85%  -94.24%  -81.87%   -0.41%  -55.67%  -88.80%  -20.24%  -54.93%  -30.73%  -37.15%  -24.00%  -24.95%
Separated season latitude       5      3      25 -61.95%  -36.70%  -43.28%  -92.02%  -81.32%  -15.04%  -55.60%  -84.05%  -18.23%  -51.99%  -30.44%  -37.35%  -23.87%  -24.44%
Separated season latitude       5      3      26 -60.63%  -36.70%  -42.79%  -90.54%  -80.91%  -17.71%  -55.73%  -81.49%  -17.87%  -49.85%  -28.18%  -36.80%  -24.89%  -23.88%
Separated season latitude       5      4      24 -62.67%  -33.11%  -41.39%  -92.44%  -80.19%   34.39%  -44.92%  -88.00%  -15.05%  -57.40%  -35.99%  -39.87%  -17.04%  -22.86%
Separated season latitude       6      2      27 -65.46%  -45.61%  -50.11%  -91.12%  -81.21%  -29.62%  -59.98%  -82.05%  -27.05%  -53.98%  -36.77%  -36.77%  -37.81%  -30.15%
Separated season latitude       6      2      28 -64.69%  -45.61%  -50.18%  -89.11%  -80.84%  -30.95%  -60.13%  -80.89%  -26.37%  -53.38%  -36.64%  -35.70%  -34.36%  -30.68%
Separated season latitude       6      2      29 -63.99%  -45.61%  -49.81%  -86.28%  -80.51%  -31.86%  -57.42%  -79.97%  -24.83%  -53.49%  -36.88%  -36.19%  -31.41%  -31.29%
```

```
=====================================================================================================================================================================================
Separated season latitude      4     4     29  -51.04%  -26.95%  -27.11%  -63.45%  -77.56%  -18.90%  -31.03%  -63.49%   -6.80%  -39.76%  -16.95%  -29.53%   -9.04%  -17.55%
Separated season latitude      4     4     30  -48.03%  -26.95%  -26.79%  -54.10%  -76.30%  -20.03%  -31.06%  -55.72%   -7.06%  -38.79%  -16.72%  -25.00%   -4.18%  -18.27%
Separated season latitude      4     4     31  -44.74%  -26.95%  -25.80%  -46.54%  -75.00%  -21.38%  -33.81%  -48.50%   -7.45%  -38.64%  -18.05%  -20.97%   -9.24%  -19.03%
Separated season latitude      5     4     30  -52.49%  -33.11%  -30.94%  -55.95%  -75.88%  -27.93%  -36.77%  -58.13%  -10.47%  -45.07%  -27.16%  -28.86%  -12.72%  -24.74%
Separated season box           4     4 168026  -52.33%  -26.95%  -25.92%  -43.85%  -75.06%  -20.92%    0.50%  -49.14%  -10.18%  -36.27%  -21.02%  -20.71%  -21.75%  -18.95%
Separated season box           4     4 172027  -52.41%  -26.95%  -28.08%  -50.15%  -75.24%  -19.22%   16.33%  -59.51%   -9.86%  -36.96%  -19.14%  -22.51%  -17.21%  -17.94%
Separated season box           4     4 171027  -52.20%  -26.95%  -27.62%  -49.95%  -75.14%  -19.66%   13.15%  -56.89%  -10.19%  -36.16%  -19.58%  -22.16%  -18.26%  -18.21%
Separated season box           4     4 173028  -51.66%  -26.95%  -28.21%  -49.25%  -75.28%  -19.76%    2.44%  -59.82%   -8.68%  -35.36%  -18.82%  -19.01%  -13.38%  -18.15%
Separated season box           4     4 172028  -51.40%  -26.95%  -27.83%  -48.60%  -75.08%  -20.59%    6.38%  -58.03%   -8.90%  -35.22%  -18.92%  -21.06%  -14.80%  -18.21%
Separated season box           4     4 173029  -49.61%  -26.95%  -25.78%  -40.52%  -75.00%  -22.65%  -11.91%  -52.61%   -8.20%  -35.60%  -18.50%  -17.61%  -14.41%  -18.65%

Leatherback turtle take reduction bin # 15 ( -70% to -75%)
10 best of 4145 scenarios at this take level with minimum fishing effort disruption
=====================================================================================================================================================================================
Type of management action    #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=====================================================================================================================================================================================
Separated season latitude      4     4     33  -41.75%  -26.95%  -25.90%  -33.93%  -71.73%  -23.06%  -35.41%  -41.80%   -9.08%  -35.00%  -20.35%  -14.05%   -9.75%  -19.87%
Separated season box           4     4 172032  -41.94%  -26.95%  -24.71%  -21.08%  -71.59%  -25.74%  -25.97%  -38.30%   -9.78%  -36.16%  -20.36%  -11.25%  -15.68%  -20.24%
Separated season box           4     4 171032  -41.87%  -26.95%  -24.76%  -21.06%  -71.50%  -25.88%  -26.30%  -37.82%   -9.92%  -35.33%  -20.46%  -11.62%  -15.86%  -20.31%
Separated season box           4     4 170032  -41.79%  -26.95%  -24.87%  -20.62%  -71.30%  -25.99%  -26.30%  -37.61%  -10.11%  -34.77%  -20.50%  -10.77%  -16.08%  -20.40%
Separated season box           4     4 169032  -41.69%  -26.95%  -24.99%  -19.90%  -71.12%  -26.12%  -26.33%  -37.24%  -10.34%  -34.43%  -20.62%  -10.50%  -16.39%  -20.43%
Separated season box           4     4 168032  -41.64%  -26.95%  -25.07%  -19.76%  -71.11%  -26.19%  -26.49%  -37.04%  -10.46%  -34.31%  -20.66%   -9.59%  -16.48%  -20.46%
Separated season box           4     4 167032  -41.58%  -26.95%  -25.19%  -19.60%  -71.04%  -26.24%  -26.73%  -36.94%  -10.60%  -34.10%  -20.79%   -9.96%  -16.65%  -20.47%
Separated season box           4     4 166032  -41.49%  -26.95%  -25.26%  -19.23%  -70.95%  -26.34%  -26.97%  -36.89%  -10.71%  -33.86%  -20.88%   -9.90%  -16.71%  -20.47%
Separated season box           4     4 165032  -41.30%  -26.95%  -25.39%  -17.39%  -70.04%  -26.55%  -27.54%  -36.47%  -11.01%  -33.29%  -21.05%  -10.52%  -16.91%  -20.54%
Separated season box           4     4 173033  -41.08%  -26.95%  -24.90%  -16.17%  -70.08%  -25.78%  -27.43%  -36.11%  -10.48%  -34.94%  -21.51%   -7.26%  -15.59%  -20.52%

Leatherback turtle take reduction bin # 14 ( -65% to -70%)
10 best of 4977 scenarios at this take level with minimum fishing effort disruption
=====================================================================================================================================================================================
Type of management action    #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=====================================================================================================================================================================================
Separated season box           4     4 152032  -39.29%  -26.95%  -26.04%   -3.29%  -65.68%  -27.98%  -28.77%  -31.83%  -13.00%  -28.69%  -22.86%   -5.82%  -17.78%  -21.04%
Separated season box           4     4 151032  -39.24%  -26.95%  -26.05%   -3.19%  -65.56%  -28.01%  -28.85%  -31.74%  -13.05%  -28.75%  -22.88%   -4.35%  -17.94%  -21.07%
Separated season box           4     4 150032  -39.07%  -26.95%  -26.06%   -1.96%  -65.01%  -27.76%  -29.22%  -31.69%  -13.11%  -28.67%  -22.97%   -3.42%  -18.04%  -21.08%
Separated season box           4     4 161033  -39.12%  -26.95%  -25.70%   -2.20%  -65.84%  -27.56%  -29.64%  -31.56%  -12.72%  -29.36%  -22.84%   -4.52%  -17.99%  -21.02%
Separated season box           4     4 160033  -38.96%  -26.95%  -25.74%   -1.30%  -65.61%  -27.64%  -29.73%  -31.29%  -12.87%  -29.37%  -22.98%   -4.86%  -18.05%  -21.02%
Separated season box           4     4 159033  -38.89%  -26.95%  -25.80%   -0.61%  -65.49%  -27.68%  -29.83%  -31.22%  -12.94%  -29.33%  -23.05%   -5.13%  -18.15%  -21.03%
Separated season box           4     4 158033  -38.80%  -26.95%  -25.85%   -0.27%  -65.18%  -27.75%  -29.94%  -31.19%  -13.00%  -29.25%  -23.11%   -5.02%  -18.22%  -21.04%
Separated season box           4     4 157033  -38.72%  -26.95%  -25.89%    0.12%  -65.00%  -27.79%  -30.01%  -31.16%  -13.03%  -29.11%  -23.15%   -5.07%  -18.22%  -21.04%
Separated season box           4     4 165034  -39.28%  -26.95%  -25.58%   -8.39%  -65.99%  -27.23%  -30.60%  -33.95%  -12.03%  -31.90%  -22.78%   -2.95%  -17.35%  -20.84%
Separated season box           4     4 164034  -39.00%  -26.95%  -25.63%   -6.33%  -65.15%  -27.41%  -30.75%  -33.02%  -12.19%  -31.03%  -22.87%   -1.64%  -17.43%  -20.90%

Leatherback turtle take reduction bin # 13 ( -60% to -65%)
10 best of 3720 scenarios at this take level with minimum fishing effort disruption
=====================================================================================================================================================================================
Type of management action    #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=====================================================================================================================================================================================
Separated season latitude      3     4     32  -35.79%  -19.00%  -19.83%  -37.12%  -61.90%  -10.68%  -22.69%  -36.01%   -4.20%  -29.07%   -7.62%  -15.69%   -8.73%  -14.33%
Separated season box           3     4 173031  -36.54%  -19.00%  -19.11%  -30.68%  -60.21%  -12.67%  -13.56%  -34.34%   -5.06%  -26.69%   -8.02%  -13.53%  -11.66%  -14.23%
Separated season box           4     4 146033  -37.51%  -26.95%  -26.10%    1.82%  -61.07%  -28.23%  -31.64%  -30.47%  -13.51%  -28.67%  -23.63%   -1.07%  -18.75%  -21.16%
Separated season box           4     4 148034  -37.36%  -26.95%  -25.93%    2.93%  -61.12%  -28.28%  -31.80%  -30.26%  -13.46%  -28.59%  -23.68%   -0.76%  -18.90%  -21.12%
Separated season box           4     4 147034  -37.13%  -26.95%  -25.97%    2.90%  -60.47%  -28.33%  -32.09%  -30.09%  -13.54%  -28.73%  -23.75%   -0.43%  -19.05%  -21.14%
Separated season box           4     4 146034  -36.96%  -26.95%  -26.00%    3.07%  -60.03%  -28.38%  -32.31%  -30.08%  -13.59%  -28.81%  -23.80%   -0.25%  -19.00%  -21.15%
Separated season box           4     4 161035  -37.37%  -26.95%  -25.80%    1.02%  -60.46%  -28.18%  -31.93%  -30.50%  -13.18%  -29.00%  -23.53%   -1.47%  -18.42%  -21.09%
Separated season box           4     4 160035  -37.26%  -26.95%  -25.81%    1.77%  -60.27%  -28.23%  -31.97%  -30.32%  -13.26%  -28.98%  -23.59%   -1.66%  -18.62%  -21.10%
Separated season box           4     4 159035  -37.21%  -26.95%  -25.84%    2.40%  -60.17%  -28.27%  -32.07%  -30.24%  -13.32%  -28.97%  -23.63%   -1.82%  -18.71%  -21.11%
Separated season box           4     4 165036  -37.47%  -26.95%  -25.85%   -2.76%  -60.02%  -28.02%  -32.00%  -31.23%  -13.09%  -30.36%  -23.53%   -0.64%  -18.29%  -21.04%
```

Leatherback turtle take reduction bin # 12 (-55% to -60%)
10 best of 3870 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	4	30	-33.09%	-10.04%	-11.38%	-52.67%	-55.80%	0.46%	-3.19%	-37.68%	1.26%	-17.80%	0.78%	-21.89%	-0.75%	-5.40%
Separated season latitude	3	4	34	-33.25%	-19.00%	-20.38%	-25.10%	-56.48%	-12.36%	-23.95%	-31.47%	-6.31%	-25.00%	-10.02%	-9.62%	-10.23%	-14.98%
Separated season box	3	4	164032	-33.52%	-19.00%	-19.80%	-16.87%	-55.46%	-14.74%	-16.92%	-27.41%	-7.57%	-22.58%	-10.16%	-8.27%	-14.80%	-15.14%
Separated season box	3	4	171033	-33.53%	-19.00%	-19.21%	-18.83%	-56.86%	-13.92%	-17.24%	-27.96%	-6.80%	-24.46%	-10.28%	-8.37%	-14.04%	-15.14%
Separated season box	3	4	170033	-33.44%	-19.00%	-19.29%	-18.25%	-56.54%	-14.07%	-17.25%	-27.86%	-6.95%	-23.99%	-10.34%	-7.45%	-14.18%	-15.17%
Separated season box	3	4	169033	-33.31%	-19.00%	-19.41%	-17.28%	-56.17%	-14.21%	-17.32%	-27.55%	-7.17%	-23.75%	-10.48%	-7.17%	-14.43%	-15.20%
Separated season box	3	4	168033	-33.25%	-19.00%	-19.48%	-17.12%	-56.16%	-14.28%	-17.44%	-27.38%	-7.32%	-23.73%	-10.56%	-6.25%	-14.55%	-15.24%
Separated season box	3	4	167033	-33.20%	-19.00%	-19.57%	-16.96%	-56.09%	-14.32%	-17.62%	-27.33%	-7.45%	-23.60%	-10.65%	-6.60%	-14.74%	-15.25%
Separated season box	3	4	166033	-33.12%	-19.00%	-19.63%	-16.52%	-55.99%	-14.39%	-17.79%	-27.32%	-7.52%	-23.41%	-10.71%	-6.86%	-14.84%	-15.25%
Separated season box	3	4	165033	-32.95%	-19.00%	-19.71%	-15.08%	-55.15%	-14.54%	-18.32%	-27.08%	-7.68%	-23.03%	-10.81%	-7.51%	-15.04%	-15.27%

Leatherback turtle take reduction bin # 11 (-50% to -55%)
10 best of 3393 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	4	31	-29.46%	-10.04%	-10.46%	-44.93%	-54.20%	-1.04%	-6.03%	-29.24%	0.81%	-17.55%	-0.58%	-17.96%	-5.04%	-6.14%
Separated season latitude	2	4	32	-27.43%	-10.04%	-10.46%	-38.12%	-52.67%	-1.99%	-7.31%	-25.05%	0.09%	-17.30%	-1.48%	-13.92%	-5.25%	-6.65%
Separated season latitude	2	4	33	-26.22%	-10.04%	-10.69%	-32.72%	-50.68%	-2.57%	-7.33%	-22.34%	-1.14%	-13.96%	-2.89%	-11.10%	-5.85%	-7.00%
Separated season box	2	4	173031	-28.14%	-10.04%	-9.76%	-32.93%	-51.15%	-3.90%	2.75%	-23.75%	-0.67%	-14.93%	-1.88%	-11.62%	-8.48%	-6.56%
Separated season box	2	4	172031	-27.99%	-10.04%	-9.86%	-32.61%	-50.89%	-4.10%	2.70%	-23.39%	-0.82%	-14.64%	-2.07%	-12.83%	-9.06%	-6.64%
Separated season box	2	4	171031	-27.91%	-10.04%	-9.89%	-32.60%	-50.80%	-4.23%	2.39%	-22.79%	-0.99%	-13.81%	-2.25%	-13.23%	-9.45%	-6.75%
Separated season box	2	4	170031	-27.80%	-10.04%	-9.98%	-32.09%	-50.49%	-4.37%	2.34%	-22.31%	-1.21%	-13.32%	-2.30%	-12.39%	-9.69%	-6.84%
Separated season box	2	4	169031	-27.65%	-10.04%	-10.10%	-31.23%	-50.14%	-4.52%	2.26%	-21.82%	-1.48%	-13.05%	-2.51%	-12.14%	-10.00%	-6.87%
Separated season box	2	4	168031	-27.58%	-10.04%	-10.17%	-31.13%	-50.14%	-4.59%	2.11%	-21.59%	-1.61%	-12.96%	-2.61%	-11.26%	-10.09%	-6.92%
Separated season box	2	4	167031	-27.51%	-10.04%	-10.24%	-31.00%	-50.06%	-4.64%	1.89%	-21.36%	-1.77%	-12.80%	-2.74%	-11.67%	-10.23%	-6.94%

Leatherback turtle take reduction bin # 10 (-45% to -50%)
10 best of 3650 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	2	4	163032	-24.71%	-10.04%	-10.58%	-16.34%	-45.49%	-6.25%	-0.81%	-15.97%	-3.54%	-9.88%	-4.12%	-3.96%	-11.85%	-7.55%
Separated season box	2	4	162032	-24.35%	-10.04%	-10.66%	-13.25%	-45.05%	-6.50%	-0.99%	-14.84%	-3.91%	-8.91%	-4.39%	-4.23%	-12.25%	-7.61%
Separated season box	2	4	168033	-24.82%	-10.04%	-10.18%	-19.73%	-47.19%	-5.49%	-1.20%	-16.92%	-2.91%	-11.91%	-4.27%	-4.27%	-11.22%	-7.54%
Separated season box	2	4	167033	-24.76%	-10.04%	-10.27%	-19.57%	-47.12%	-5.54%	-1.38%	-16.88%	-3.03%	-11.79%	-4.36%	-4.63%	-11.42%	-7.55%
Separated season box	2	4	166033	-24.69%	-10.04%	-10.33%	-19.18%	-47.03%	-5.60%	-1.56%	-16.87%	-3.11%	-11.60%	-4.41%	-4.88%	-11.52%	-7.55%
Separated season box	2	4	165033	-24.52%	-10.04%	-10.40%	-17.75%	-46.20%	-5.75%	-2.08%	-16.63%	-3.27%	-11.22%	-4.51%	-5.53%	-11.72%	-7.58%
Separated season box	2	4	164033	-24.21%	-10.04%	-10.50%	-15.27%	-45.18%	-5.99%	-2.24%	-15.54%	-3.52%	-10.14%	-4.68%	-3.96%	-11.85%	-7.66%
Separated season box	2	4	173034	-24.11%	-10.04%	-10.28%	-16.59%	-45.30%	-5.56%	-2.25%	-16.60%	-3.07%	-12.63%	-4.77%	-1.57%	-10.99%	-7.55%
Separated season box	2	4	172034	-24.00%	-10.04%	-10.26%	-16.40%	-45.09%	-5.71%	-2.33%	-16.57%	-3.13%	-12.33%	-4.81%	-2.63%	-11.20%	-7.56%
Separated season box	2	4	171034	-23.93%	-10.04%	-10.25%	-16.39%	-45.01%	-5.82%	-2.59%	-16.30%	-3.21%	-11.91%	-4.85%	-2.94%	-11.27%	-7.58%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
10 best of 4035 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	2	4	160034	-22.15%	-10.04%	-10.68%	-4.19%	-41.19%	-7.04%	-4.09%	-12.63%	-4.83%	-7.72%	-5.69%	-1.35%	-13.20%	-7.85%
Separated season box	2	4	159034	-22.10%	-10.04%	-10.71%	-3.76%	-41.07%	-7.07%	-4.15%	-12.56%	-4.89%	-7.73%	-5.74%	-1.60%	-13.30%	-7.87%
Separated season box	2	4	158034	-22.01%	-10.04%	-10.75%	-3.41%	-40.77%	-7.14%	-4.24%	-12.53%	-4.94%	-7.69%	-5.78%	-1.58%	-13.37%	-7.87%
Separated season box	2	4	157034	-21.93%	-10.04%	-10.78%	-3.05%	-40.61%	-7.17%	-4.31%	-12.50%	-4.97%	-7.66%	-5.81%	-1.57%	-13.37%	-7.88%
Separated season box	2	4	156034	-21.90%	-10.04%	-10.79%	-2.93%	-40.57%	-7.20%	-4.32%	-12.47%	-5.00%	-7.66%	-5.83%	-1.42%	-13.44%	-7.88%
Separated season box	2	4	155034	-21.90%	-10.04%	-10.79%	-2.94%	-40.56%	-7.20%	-4.33%	-12.48%	-5.01%	-7.56%	-5.85%	-1.45%	-13.46%	-7.88%
Separated season box	2	4	154034	-21.89%	-10.04%	-10.80%	-2.95%	-40.54%	-7.20%	-4.35%	-12.49%	-5.02%	-7.55%	-5.85%	-1.46%	-13.46%	-7.88%
Separated season box	2	4	153034	-21.88%	-10.04%	-10.81%	-2.95%	-40.51%	-7.21%	-4.35%	-12.49%	-5.03%	-7.49%	-5.86%	-1.41%	-13.45%	-7.89%
Separated season box	2	4	152034	-21.83%	-10.04%	-10.82%	-2.98%	-40.35%	-7.22%	-4.39%	-12.39%	-5.07%	-7.52%	-5.88%	-1.23%	-13.47%	-7.89%
Separated season box	2	4	151034	-21.81%	-10.04%	-10.84%	-2.98%	-40.29%	-7.23%	-4.41%	-12.34%	-5.11%	-7.56%	-5.92%	-0.32%	-13.57%	-7.90%

				FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	2	4	146036	-20.39%	-10.04%	-10.99%	-2.28%	-35.23%	-7.62%	-5.86%	-11.46%	-5.50%	-7.64%	-6.33%	-0.22%	-13.98%	-7.97%
Separated season box	2	4	158038	-20.40%	-10.04%	-10.95%	-2.50%	-35.05%	-7.62%	-5.77%	-11.38%	-5.45%	-7.76%	-6.28%	-0.11%	-13.92%	-7.95%
Separated season box	2	4	157038	-20.38%	-10.04%	-10.95%	-2.44%	-35.03%	-7.63%	-5.79%	-11.35%	-5.46%	-7.70%	-6.29%	-0.13%	-13.92%	-7.95%
Separated season box	2	4	156038	-20.38%	-10.04%	-10.96%	-2.43%	-35.03%	-7.64%	-5.80%	-11.35%	-5.46%	-7.71%	-6.29%	-0.14%	-13.93%	-7.95%
Separated season box	2	4	155038	-20.38%	-10.04%	-10.96%	-2.43%	-35.03%	-7.64%	-5.80%	-11.35%	-5.46%	-7.70%	-6.29%	-0.14%	-13.94%	-7.95%
Separated season box	2	4	154038	-20.37%	-10.04%	-10.96%	-2.42%	-35.02%	-7.64%	-5.80%	-11.36%	-5.47%	-7.71%	-6.29%	-0.15%	-13.93%	-7.95%
Separated season box	2	4	153038	-20.37%	-10.04%	-10.96%	-2.42%	-35.02%	-7.64%	-5.80%	-11.36%	-5.47%	-7.71%	-6.29%	-0.15%	-13.93%	-7.95%
Separated season box	2	4	152038	-20.37%	-10.04%	-10.96%	-2.42%	-35.02%	-7.64%	-5.80%	-11.36%	-5.47%	-7.71%	-6.30%	-0.15%	-13.94%	-7.95%
Separated season box	2	4	151038	-20.37%	-10.04%	-10.96%	-2.42%	-35.02%	-7.64%	-5.81%	-11.37%	-5.47%	-7.71%	-6.30%	-0.16%	-13.96%	-7.95%
Separated season box	2	4	170039	-20.39%	-10.04%	-10.84%	-3.04%	-35.00%	-7.59%	-5.83%	-11.35%	-5.34%	-7.72%	-6.23%	-0.36%	-13.34%	-7.94%

Leatherback turtle take reduction bin # 7 (-30% to -35%)
10 best of 5360 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Season	2	4	0	-20.07%	-10.04%	-11.02%	-2.19%	-34.23%	-7.78%	-6.22%	-11.33%	-5.58%	-7.75%	-6.39%	-0.60%	-13.99%	-7.97%
Separated season box	2	4	146038	-20.18%	-10.04%	-11.00%	-2.24%	-34.30%	-7.70%	-6.07%	-11.33%	-5.55%	-7.67%	-6.36%	-0.36%	-13.99%	-7.97%
Separated season box	2	4	156039	-20.18%	-10.04%	-10.98%	-2.24%	-34.77%	-7.72%	-6.08%	-11.37%	-5.50%	-7.78%	-6.31%	-0.41%	-13.96%	-7.96%
Separated season box	2	4	155039	-20.18%	-10.04%	-10.98%	-2.24%	-34.77%	-7.72%	-6.08%	-11.37%	-5.50%	-7.77%	-6.32%	-0.41%	-13.96%	-7.96%
Separated season box	2	4	153039	-20.18%	-10.04%	-10.98%	-2.24%	-34.77%	-7.72%	-6.09%	-11.37%	-5.50%	-7.77%	-6.32%	-0.42%	-13.97%	-7.96%
Separated season box	2	4	150039	-20.17%	-10.04%	-10.99%	-2.23%	-34.60%	-7.72%	-6.09%	-11.37%	-5.51%	-7.75%	-6.32%	-0.42%	-13.93%	-7.96%
Separated season box	2	4	149039	-20.17%	-10.04%	-10.99%	-2.23%	-34.60%	-7.72%	-6.09%	-11.35%	-5.52%	-7.73%	-6.34%	-0.44%	-13.97%	-7.97%
Separated season box	2	4	148039	-20.15%	-10.04%	-10.99%	-2.23%	-34.36%	-7.73%	-6.10%	-11.34%	-5.53%	-7.68%	-6.35%	-0.45%	-13.95%	-7.97%
Separated season box	2	4	147039	-20.13%	-10.04%	-11.00%	-2.18%	-34.29%	-7.74%	-6.13%	-11.33%	-5.55%	-7.68%	-6.36%	-0.43%	-13.98%	-7.97%
Separated season box	2	4	146039	-20.11%	-10.04%	-11.01%	-2.19%	-34.26%	-7.76%	-6.17%	-11.33%	-5.56%	-7.69%	-6.37%	-0.47%	-13.99%	-7.97%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
10 best of 5006 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	1	4	32	-17.36%	0.00%	0.80%	-38.08%	-27.48%	6.72%	-0.14%	-14.51%	6.88%	-10.27%	6.68%	-12.13%	4.84%	0.52%
Separated season latitude	1	4	33	-16.15%	0.00%	0.57%	-32.68%	-25.48%	6.14%	-0.46%	-11.79%	5.65%	-6.92%	5.29%	-9.29%	4.23%	0.17%
Separated season box	1	4	170031	-17.78%	0.00%	1.31%	-32.04%	-25.81%	4.43%	9.27%	-11.90%	5.56%	-6.36%	5.85%	-10.57%	0.23%	0.34%
Separated season box	1	4	169031	-17.63%	0.00%	1.19%	-31.18%	-25.47%	4.29%	9.21%	-11.39%	5.30%	-6.08%	5.64%	-10.32%	-0.09%	0.31%
Separated season box	1	4	168031	-17.57%	0.00%	1.12%	-31.09%	-25.47%	4.22%	9.05%	-11.16%	5.16%	-5.99%	5.54%	-9.44%	-0.18%	0.26%
Separated season box	1	4	167031	-17.49%	0.00%	1.06%	-30.96%	-25.39%	4.16%	8.84%	-10.92%	5.01%	-5.83%	5.42%	-9.85%	-0.31%	0.24%
Separated season box	1	4	166031	-17.38%	0.00%	1.00%	-30.46%	-25.24%	4.05%	8.70%	-10.57%	4.84%	-5.60%	5.37%	-9.73%	-0.44%	0.22%
Merged season latitude	9	4	27	-16.39%	0.00%	0.12%	-37.71%	-26.03%	11.62%	-13.65%	-25.98%	4.00%	-9.17%	9.95%	-11.88%	3.19%	5.96%
Merged season latitude	10	4	28	-16.31%	0.00%	-0.91%	-54.66%	-27.17%	10.46%	-9.41%	-28.10%	5.74%	-11.13%	9.30%	-17.97%	8.93%	5.04%
Merged season latitude	11	9	29	-17.68%	0.00%	-0.46%	-52.25%	-25.38%	8.99%	4.19%	-31.35%	8.00%	-11.96%	6.56%	-24.35%	12.11%	3.33%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
10 best of 5955 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Latitude	0	0	31	-9.50%	0.00%	0.57%	-42.67%	-20.08%	6.71%	0.57%	-17.31%	6.43%	-9.86%	5.86%	-17.28%	9.09%	1.86%
Merged season latitude	5	9	26	-10.29%	0.00%	0.32%	-42.99%	-20.24%	13.94%	-4.04%	-17.91%	4.47%	-14.34%	3.32%	-19.54%	7.63%	2.81%
Merged season latitude	7	7	29	-10.46%	0.00%	0.11%	-49.38%	-20.68%	8.37%	-5.16%	-20.16%	6.30%	-10.79%	8.25%	-17.21%	7.32%	3.06%
Merged season latitude	8	6	29	-10.79%	0.00%	0.10%	-49.39%	-21.06%	8.49%	-6.37%	-20.29%	6.26%	-10.71%	8,42%	-17.30%	6.69%	3.07%
Merged season latitude	8	6	30	-9.49%	0.00%	0.29%	-44.88%	-20.21%	7.46%	-1.36%	-18.86%	6.14%	-10.71%	6.97%	-13.71%	8.20%	2.37%
Merged season latitude	9	4	29	-10.27%	0.00%	1.26%	-32.09%	-20.53%	8.29%	-5.32%	-18.31%	5.24%	-10.18%	6.46%	-10.62%	5.91%	3.47%
Merged season latitude	9	5	30	-9.64%	0.00%	0.34%	-44.88%	-20.62%	7.54%	-1.26%	-18.94%	6.21%	-10.82%	6.96%	-13.89%	8.02%	2.37%
Merged season latitude	10	4	30	-10.02%	0.00%	0.27%	-44.86%	-21.23%	7.60%	-1.08%	-19.82%	6.26%	-10.82%	6.67%	-14.33%	8.48%	2.65%
Merged season latitude	11	4	31	-9.26%	0.00%	0.59%	-42.54%	-20.01%	6.68%	0.27%	-16.92%	6.38%	-10.09%	5.80%	-16.68%	8.73%	1.83%
Merged season latitude	11	9	31	-8.62%	0.00%	0.88%	-35.26%	-20.03%	5.84%	2.26%	-15.67%	6.16%	-10.30%	4.86%	-16.63%	8.77%	1.42%

Leatherback turtle take reduction bin # 4 (-15% to -20%)
10 best of 9396 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Merged season latitude	3	11	31	-5.00%	0.00%	1.04%	-24.31%	-15.27%	2.55%	3.56%	-9.53%	4.58%	-8.53%	3.00%	-11.29%	5.75%	0.89%
Merged season latitude	4	9	31	-4.89%	0.00%	1.58%	-20.19%	-15.06%	5.05%	-1.24%	-10.43%	4.61%	-10.64%	2.99%	-9.82%	6.36%	1.08%
Merged season latitude	4	10	32	-5.21%	0.00%	0.78%	-23.83%	-15.76%	3.09%	2.32%	-9.61%	4.61%	-10.00%	3.22%	-10.68%	6.85%	0.82%
Merged season latitude	5	9	33	-5.09%	0.00%	0.53%	-21.57%	-15.02%	4.25%	0.14%	-9.00%	3.74%	-6.66%	2.52%	-9.63%	7.19%	0.57%
Merged season latitude	6	9	33	-5.15%	0.00%	0.53%	-21.55%	-15.06%	4.26%	0.19%	-9.01%	3.77%	-6.66%	2.58%	-9.71%	7.24%	0.57%
Merged season latitude	7	9	33	-5.21%	0.00%	0.54%	-21.54%	-15.09%	4.27%	0.27%	-9.00%	3.77%	-6.65%	2.59%	-9.75%	7.33%	0.57%
Merged season latitude	8	9	33	-5.21%	0.00%	0.54%	-21.54%	-15.12%	4.27%	0.27%	-8.99%	3.77%	-6.65%	2.60%	-9.75%	7.33%	0.57%
Merged season latitude	9	9	33	-5.22%	0.00%	0.54%	-21.54%	-15.12%	4.27%	0.28%	-8.99%	3.77%	-6.65%	2.60%	-9.87%	7.33%	0.57%
Merged season latitude	9	11	32	-5.27%	0.00%	0.91%	-22.71%	-15.78%	2.56%	2.14%	-8.31%	4.30%	-7.62%	3.30%	-10.19%	4.28%	0.81%
Merged season latitude	10	10	33	-5.08%	0.00%	0.44%	-21.69%	-15.33%	3.20%	1.15%	-8.00%	3.61%	-6.38%	2.66%	-9.06%	5.72%	0.62%

Leatherback turtle take reduction bin # 3 (-10% to -15%)
10 best of 14312 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Merged season latitude	2	11	33	-2.94%	0.00%	0.78%	-12.07%	-10.95%	1.78%	0.41%	-4.76%	2.52%	-4.22%	1.38%	-5.78%	3.11%	0.53%
Merged season box	2	11	165031	-2.91%	0.00%	0.78%	-9.77%	-10.09%	1.56%	1.95%	-4.57%	1.99%	-3.89%	1.34%	-4.59%	1.66%	0.30%
Merged season box	2	11	168032	-2.94%	0.00%	0.87%	-10.45%	-10.93%	1.63%	2.06%	-4.88%	2.31%	-4.23%	1.53%	-3.82%	1.78%	0.40%
Merged season box	2	11	167032	-2.92%	0.00%	0.77%	-10.24%	-10.87%	1.61%	2.08%	-4.82%	2.20%	-4.00%	1.44%	-4.03%	1.67%	0.40%
Merged season box	2	11	166032	-2.90%	0.00%	0.73%	-10.07%	-10.80%	1.57%	2.06%	-4.81%	2.12%	-3.86%	1.37%	-4.11%	1.63%	0.40%
Merged season box	2	11	173033	-2.87%	0.00%	0.80%	-10.99%	-10.37%	1.55%	1.61%	-4.48%	2.29%	-3.82%	1.35%	-2.45%	2.32%	0.47%
Merged season box	2	11	172033	-2.84%	0.00%	0.76%	-10.70%	-10.27%	1.50%	1.81%	-4.43%	2.23%	-3.84%	1.32%	-3.22%	2.13%	0.45%
Merged season box	2	11	171033	-2.84%	0.00%	0.75%	-10.57%	-10.23%	1.48%	1.84%	-4.31%	2.20%	-3.44%	1.30%	-3.17%	1.97%	0.40%
Merged season box	2	11	170033	-2.81%	0.00%	0.71%	-10.29%	-10.11%	1.44%	1.90%	-4.30%	2.09%	-3.04%	1.28%	-3.07%	1.86%	0.36%
Merged season latitude	9	11	34	-2.95%	0.00%	0.32%	-11.44%	-10.55%	1.46%	0.88%	-4.38%	2.02%	-3.48%	1.27%	-4.34%	2.52%	0.35%

Leatherback turtle take reduction bin # 2 (-5% to -10%)
10 best of 18589 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Merged season box	1	12	153027	-1.15%	0.00%	0.11%	-0.21%	-5.26%	0.40%	1.06%	-1.19%	0.29%	-0.12%	0.29%	-2.94%	0.19%	0.07%
Merged season box	1	12	153030	-1.14%	0.00%	0.10%	-0.21%	-5.24%	0.39%	1.05%	-1.19%	0.29%	-0.13%	0.29%	-2.90%	0.23%	0.07%
Merged season box	1	12	153031	-1.14%	0.00%	0.10%	-0.22%	-5.24%	0.39%	1.05%	-1.19%	0.29%	-0.13%	0.28%	-2.90%	0.23%	0.07%
Merged season box	1	12	155032	-1.15%	0.00%	0.11%	-0.25%	-5.28%	0.40%	1.05%	-1.19%	0.29%	-0.18%	0.29%	-2.96%	0.21%	0.07%
Merged season box	1	12	154032	-1.15%	0.00%	0.10%	-0.26%	-5.25%	0.40%	1.04%	-1.19%	0.29%	-0.15%	0.29%	-2.96%	0.20%	0.07%
Merged season box	1	12	153032	-1.13%	0.00%	0.10%	-0.24%	-5.19%	0.39%	1.03%	-1.19%	0.28%	-0.14%	0.28%	-2.90%	0.23%	0.07%
Merged season box	1	12	161033	-1.13%	0.00%	0.20%	-0.49%	-5.06%	0.39%	0.97%	-1.19%	0.40%	-0.58%	0.35%	-2.53%	0.24%	0.07%
Merged season box	1	12	160033	-1.12%	0.00%	0.18%	-0.48%	-5.03%	0.39%	0.96%	-1.14%	0.34%	-0.59%	0.32%	-2.57%	0.22%	0.08%
Merged season box	1	12	159033	-1.12%	0.00%	0.16%	-0.44%	-5.01%	0.38%	0.96%	-1.13%	0.33%	-0.60%	0.31%	-2.57%	0.22%	0.07%
Merged season box	1	12	158033	-1.12%	0.00%	0.15%	-0.44%	-5.00%	0.38%	0.96%	-1.14%	0.32%	-0.55%	0.30%	-2.48%	0.21%	0.07%

albacore catch change, Yel = yellowfin tuna catch change, Blu = bluefin tuna catch change, Mah = mahi-mahi catch change, Opa = opah catch change. Other fish species included in the revenue calculations are not presented to save space. Results are not presented in any ordered sequence.

Fishing effort disruption bin # 3 (-10% to -15%)
25 best of 8173 scenarios at this level optimized for leatherback

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Latitude	0	0	30	-13.54%	0.00%	-0.26%	-49.88%	-22.23%	8.15%	2.82%	-24.38%	7.22%	-9.99%	7.44%	-20.73%	14.20%	2.85%
Separated season latitude	1	4	34	-14.77%	0.00%	0.21%	-26.41%	-22.18%	5.08%	-0.96%	-10.19%	4.78%	-6.19%	4.35%	-5.71%	3.23%	-0.12%
Separated season box	1	4	170033	-14.93%	0.00%	1.27%	-20.67%	-22.46%	3.44%	5.75%	-6.81%	4.22%	-5.15%	4.12%	-3.67%	-0.83%	-0.31%
Separated season box	1	4	169033	-14.80%	0.00%	1.15%	-19.85%	-22.18%	3.32%	5.71%	-6.53%	4.02%	-4.90%	3.99%	-3.38%	-1.07%	-0.34%
Separated season box	1	4	168033	-14.74%	0.00%	1.08%	-19.70%	-22.17%	3.25%	5.59%	-6.37%	3.88%	-4.88%	3.92%	-2.47%	-1.18%	-0.37%
Merged season latitude	7	7	26	-13.54%	0.00%	-0.89%	-54.36%	-22.22%	16.00%	-11.67%	-23.96%	2.93%	-10.36%	11.71%	-21.51%	1.64%	5.33%
Merged season latitude	9	4	28	-13.60%	0.00%	0.51%	-35.22%	-23.67%	9.71%	-8.45%	-22.62%	4.34%	-9.47%	7.71%	-10.70%	6.22%	4.84%
Merged season latitude	9	5	27	-14.75%	0.00%	-0.08%	-52.63%	-23.93%	11.51%	-12.23%	-23.58%	4.60%	-9.40%	11.54%	-18.44%	-0.05%	5.23%
Merged season latitude	9	5	28	-12.64%	0.00%	-0.02%	-51.39%	-23.05%	9.90%	-8.99%	-21.64%	4.99%	-9.71%	9.81%	-17.39%	3.08%	4.23%
Merged season latitude	9	6	28	-14.93%	0.00%	-1.48%	-64.37%	-22.39%	10.57%	-8.80%	-27.76%	5.71%	-9.51%	10.86%	-22.21%	8.45%	4.16%
Merged season latitude	10	4	29	-12.91%	0.00%	-0.04%	-50.05%	-23.95%	8.97%	-4.85%	-23.67%	6.72%	-11.63%	7.88%	-17.90%	8.49%	3.66%
Merged season latitude	10	5	29	-13.91%	0.00%	-0.14%	-57.96%	-22.83%	9.34%	-4.51%	-25.40%	7.43%	-11.04%	9.03%	-21.06%	8.72%	3.15%
Merged season latitude	11	9	30	-12.55%	0.00%	0.12%	-42.43%	-22.18%	7.22%	4.91%	-22.47%	7.16%	-10.64%	5.98%	-20.20%	13.33%	2.20%
Merged season box	10	4	166026	-14.49%	0.00%	0.35%	-29.25%	-22.60%	5.38%	14.45%	-9.59%	2.49%	-5.80%	3.78%	-7.55%	-8.28%	2.10%
Merged season box	10	4	171027	-14.89%	0.00%	0.28%	-35.30%	-23.89%	5.83%	15.17%	-16.39%	4.38%	-7.01%	6.23%	-9.41%	-2.82%	3.47%
Merged season box	10	4	170027	-14.39%	0.00%	0.26%	-34.44%	-23.45%	5.58%	14.77%	-15.57%	4.45%	-6.61%	5.89%	-8.51%	-3.67%	3.19%
Merged season box	10	4	169027	-13.88%	0.00%	0.34%	-32.68%	-22.68%	5.30%	14.25%	-13.98%	4.23%	-6.42%	5.33%	-8.42%	-4.42%	3.02%
Merged season box	10	4	168027	-13.36%	0.00%	0.57%	-31.79%	-22.58%	5.08%	13.69%	-13.16%	4.30%	-6.26%	4.84%	-7.20%	-4.63%	2.87%
Merged season box	10	4	167027	-12.93%	0.00%	0.67%	-30.86%	-22.30%	4.93%	13.05%	-11.11%	3.92%	-6.30%	4.25%	-7.64%	-4.88%	2.67%
Merged season box	10	4	173028	-13.60%	0.00%	0.45%	-35.59%	-22.76%	5.53%	12.85%	-18.03%	5.29%	-7.93%	6.46%	-6.96%	4.94%	3.21%
Merged season box	10	4	172028	-13.04%	0.00%	0.38%	-35.30%	-22.60%	5.23%	13.16%	-16.59%	5.09%	-7.59%	5.83%	-8.63%	2.93%	3.16%
Merged season box	10	4	171028	-12.68%	0.00%	0.37%	-34.86%	-22.49%	5.05%	13.07%	-15.50%	4.87%	-6.99%	5.25%	-9.11%	1.77%	2.89%
Merged season box	11	3	167028	-14.91%	0.00%	0.93%	-32.70%	-22.21%	5.54%	24.00%	-12.27%	5.10%	-6.18%	3.74%	-11.02%	-0.16%	2.42%
Merged season box	11	4	169028	-14.64%	0.00%	-0.21%	-43.90%	-22.42%	5.24%	16.28%	-18.55%	5.63%	-6.00%	5.03%	-12.76%	2.77%	2.52%
Merged season box	11	4	168028	-14.24%	0.00%	0.04%	-42.67%	-22.35%	5.06%	16.02%	-16.51%	5.67%	-5.93%	4.57%	-11.58%	2.14%	2.38%

Appendix 3. Listings of three best scenarios optimized for 1) loggerhead turtle take reduction, 2) olive ridley turtle take reduction, 3) green turtle take reduction, and 4) aggregate turtle take reduction per bin of leatherback turtle take reduction. Notations: #Mn = the number of months for a seasonal closure, Ms = the starting month of a seasonal closure, Lon/Lat = position of spatial closure, FED = fishing effort disruption, FEL = fishing effort lost, Rev = fish catch revenue change, Log = loggerhead turtle take change, Lea = leatherback turtle take change, Rid = olive ridley turtle take change, Gre = green turtle take change, Swo = swordfish catch change, Big = bigeye tuna catch change, Alb = albacore catch change, Yel = yellowfin tuna catch change, Blu = bluefin tuna catch change, Mah = mahi-mahi catch change, Opa = opah catch change. Other fish species included in the revenue calculations are not presented to save space. Results are not presented in any ordered sequence.

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
3 best of 2327 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	10	11	21	-95.60%	-78.86%	-88.03%	-100.00%	-97.53%	-4.48%	-88.83%	-99.24%	-86.89%	-92.16%	-82.84%	-57.45%	-89.40%	-80.39%
Separated season latitude	11	10	21	-97.85%	-86.31%	-93.03%	-100.00%	-99.13%	19.68%	-91.94%	-99.67%	-95.10%	-95.17%	-87.20%	-57.38%	-95.87%	-89.81%
Separated season latitude	11	11	21	-97.74%	-84.25%	-90.44%	-100.00%	-97.53%	-76.46%	-92.61%	-99.43%	-89.27%	-95.26%	-92.25%	-59.38%	-91.77%	-86.20%

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
3 best of 2327 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	1	173	-99.98%	-82.54%	-87.11%	-98.52%	-95.22%	-99.42%	-97.06%	-96.24%	-96.54%	-96.34%	-99.45%	-60.00%	-96.69%	-100.00%
Separated season longitude	11	1	171	-99.98%	-82.54%	-79.74%	-98.63%	-95.44%	-99.37%	-97.03%	-96.49%	-96.66%	-96.64%	-99.44%	-60.00%	-96.63%	-99.98%
Separated season longitude	11	1	170	-99.98%	-82.54%	-81.17%	-98.63%	-95.44%	-99.37%	-97.03%	-95.25%	-93.44%	-95.92%	-99.08%	-60.00%	-98.87%	-99.98%

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
3 best of 2327 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	1	173	-99.98%	-82.54%	-87.11%	-98.52%	-95.22%	-99.42%	-97.06%	-96.24%	-96.54%	-96.34%	-99.45%	-60.00%	-96.69%	-100.00%
Separated season longitude	11	1	172	-99.98%	-82.54%	-88.68%	-98.63%	-95.44%	-99.37%	-97.03%	-96.43%	-96.64%	-96.55%	-99.46%	-60.00%	-96.64%	-99.98%
Separated season longitude	11	1	170	-99.98%	-82.54%	-81.17%	-98.63%	-95.44%	-99.37%	-97.03%	-95.25%	-93.44%	-95.92%	-99.08%	-60.00%	-98.87%	-99.98%

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
3 best of 2327 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	1	172	-99.98%	-82.54%	-88.68%	-98.63%	-95.44%	-99.37%	-97.03%	-96.43%	-96.64%	-96.55%	-99.46%	-60.00%	-96.64%	-99.98%
Separated season longitude	11	1	171	-99.98%	-82.54%	-79.74%	-98.63%	-95.44%	-99.37%	-97.03%	-96.49%	-96.66%	-96.64%	-99.44%	-60.00%	-96.63%	-99.98%
Separated season longitude	11	1	170	-99.98%	-82.54%	-81.17%	-98.63%	-95.44%	-99.37%	-97.03%	-95.25%	-93.44%	-95.92%	-99.08%	-60.00%	-98.87%	-99.98%

Leatherback turtle take reduction bin # 19 (-90% to -95%)
3 best of 3249 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	9	12	21	-92.00%	-70.17%	-83.35%	-99.98%	-93.65%	7.93%	-83.58%	-98.90%	-75.02%	-89.62%	-76.12%	-56.13%	-79.41%	-72.09%
Separated season latitude	10	12	21	-94.14%	-75.60%	-85.77%	-99.98%	-93.69%	-65.36%	-87.37%	-99.08%	-77.43%	-92.72%	-85.65%	-58.06%	-81.82%	-77.90%
Separated season latitude	11	12	21	-96.40%	-83.02%	-90.40%	-99.98%	-94.12%	-77.33%	-90.58%	-99.51%	-84.30%	-96.11%	-90.97%	-58.33%	-87.29%	-87.56%

Leatherback turtle take reduction bin # 19 (-90% to -95%)
3 best of 3249 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	1	173	-99.92%	-73.90%	-87.54%	-93.91%	-93.01%	-99.05%	-91.55%	-94.77%	-96.24%	-92.30%	-99.35%	-49.71%	-96.53%	-100.00%
Separated season longitude	11	12	173	-99.93%	-83.02%	-95.72%	-93.05%	-94.91%	-99.24%	-91.20%	-98.31%	-99.65%	-94.96%	-99.85%	-48.58%	-99.81%	-100.00%
Separated season longitude	11	12	172	-99.91%	-83.02%	-78.27%	-92.60%	-94.94%	-99.28%	-91.16%	-97.94%	-99.58%	-94.71%	-99.85%	-51.23%	-99.85%	-99.98%

Leatherback turtle take reduction bin # 19 (-90% to -95%)
3 best of 3249 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	1	173	-99.92%	-73.90%	-87.54%	-93.91%	-93.01%	-99.05%	-91.55%	-94.77%	-96.24%	-92.30%	-99.35%	-49.71%	-96.53%	-100.00%
Separated season longitude	10	1	172	-99.89%	-73.90%	-75.48%	-93.65%	-93.19%	-99.04%	-91.51%	-94.66%	-96.29%	-92.39%	-99.37%	-52.24%	-96.51%	-99.97%

```
                                                              Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=========================================================================================================================================================================
Separated season longitude     10     1    173  -99.92%  -73.90%  -87.54%  -93.91%  -93.01%  -99.05%  -91.55%  -94.77%  -96.24%  -92.30%  -99.35%  -49.71%  -96.53% -100.00%
Separated season longitude     10     1    172  -99.89%  -73.90%  -75.48%  -93.65%  -93.19%  -99.04%  -91.51%  -94.66%  -96.29%  -92.39%  -99.37%  -52.24%  -96.51%  -99.97%
Separated season longitude     11    12    173  -99.93%  -83.02%  -95.72%  -93.05%  -94.91%  -99.24%  -91.20%  -98.31%  -99.65%  -94.96%  -99.85%  -48.58%  -99.81% -100.00%

Leatherback turtle take reduction bin # 18 ( -85% to -90%)
 3 best of 2369 scenarios at this take level with maximum loggerhead turtle take reduction
=========================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat   FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=========================================================================================================================================================================
Separated season latitude      11     7     21  -96.17%  -83.24%  -85.97% -100.00%  -85.69%  -77.05%  -79.68%  -96.91%  -93.23%  -81.72%  -79.73%  -57.37%  -98.59%  -88.11%
Separated season latitude      11     7     22  -95.90%  -83.24%  -86.32% -100.00%  -85.56%  -77.98%  -79.59%  -96.77%  -93.21%  -80.36%  -80.46%  -57.39%  -98.35%  -86.57%
Separated season latitude      11     7     23  -95.72%  -83.24%  -86.44% -100.00%  -85.46%  -78.38%  -80.01%  -96.02%  -93.10%  -78.59%  -81.99%  -57.32%  -97.88%  -85.22%

Leatherback turtle take reduction bin # 18 ( -85% to -90%)
 3 best of 2369 scenarios at this take level with maximum olive ridley turtle take reduction
=========================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat   FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=========================================================================================================================================================================
Separated season longitude     10     1    170  -99.86%  -73.90%  -77.67%  -66.43%  -85.77%  -98.73%  -85.15%  -91.35%  -91.41%  -74.58%  -98.57%  -47.56%  -98.37%  -99.58%
Separated season longitude     11    10    173  -99.88%  -86.31%  -89.82%  -71.78%  -88.15%  -99.03%  -72.58%  -97.35%  -99.93%  -99.78%  -99.97%  -58.23%  -99.69%  -99.96%
Separated season longitude     11    12    169  -99.85%  -83.02%  -87.81%  -62.72%  -86.45%  -98.73%  -83.40%  -93.98%  -95.52%  -77.08%  -99.19%  -48.96%  -99.07%  -99.58%

Leatherback turtle take reduction bin # 18 ( -85% to -90%)
 3 best of 2369 scenarios at this take level with maximum green turtle take reduction
=========================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat   FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=========================================================================================================================================================================
Separated season latitude      11     8     21  -95.87%  -84.16%  -88.93%  -99.77%  -88.62%  -71.33%  -89.15%  -98.58%  -95.38%  -88.69%  -76.14%  -58.85%  -98.24%  -90.71%
Separated season latitude      11     8     22  -95.53%  -84.16%  -89.49%  -99.72%  -88.55%  -71.75%  -88.99%  -98.55%  -95.31%  -87.27%  -76.07%  -58.83%  -98.12%  -88.56%
Separated season latitude      11     8     24  -95.00%  -84.16%  -89.70%  -99.14%  -88.10%  -73.00%  -88.97%  -97.75%  -95.28%  -81.06%  -75.69%  -58.63%  -96.82%  -85.88%

Leatherback turtle take reduction bin # 18 ( -85% to -90%)
 3 best of 2369 scenarios at this take level with maximum aggregate turtle take reduction
=========================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat   FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=========================================================================================================================================================================
Separated season longitude     11     1    169  -99.97%  -82.54%  -81.17%  -98.46%  -87.00%  -89.91%  -88.53%  -74.08%  -83.63%  -89.21%  -98.97%  -60.00%  -95.55%  -99.98%
Separated season box           11    12 164032  -92.54%  -83.02%  -88.77%  -85.96%  -85.83%  -80.87%  -84.68%  -91.97%  -75.85%  -79.88%  -88.48%  -46.60%  -79.73%  -83.67%
Separated season box           11    12 164033  -92.52%  -83.02%  -88.80%  -85.73%  -85.76%  -80.92%  -84.68%  -91.83%  -75.82%  -79.42%  -88.44%  -46.45%  -79.67%  -83.66%

Leatherback turtle take reduction bin # 17 ( -80% to -85%)
 3 best of 4485 scenarios at this take level with maximum loggerhead turtle take reduction
=========================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat   FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=========================================================================================================================================================================
Separated season latitude      11     7     25  -94.08%  -83.24%  -85.99% -100.00%  -84.63%  -79.43%  -81.66%  -91.84%  -93.58%  -78.70%  -85.57%  -56.44%  -96.67%  -84.97%
Separated season latitude      11     7     26  -93.30%  -83.24%  -85.62% -100.00%  -83.82%  -79.97%  -81.87%  -90.42%  -93.23%  -78.60%  -85.56%  -57.02%  -96.60%  -84.97%
Separated season latitude      11     7     27  -92.66%  -83.24%  -85.23% -100.00%  -83.77%  -79.98%  -77.64%  -89.32%  -92.82%  -78.68%  -85.98%  -56.86%  -96.21%  -84.95%

Leatherback turtle take reduction bin # 17 ( -80% to -85%)
 3 best of 4485 scenarios at this take level with maximum olive ridley turtle take reduction
=========================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat   FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
=========================================================================================================================================================================
Separated season longitude     10     1    171  -99.88%  -73.90%  -76.57%  -60.45%  -84.19%  -98.78%  -84.28%  -92.40%  -95.78%  -74.93%  -99.13%  -42.78%  -96.46%  -99.97%
Separated season longitude     11    12    171  -99.90%  -83.02%  -88.96%  -45.25%  -82.10%  -98.91%  -80.85%  -95.54%  -99.02%  -76.89%  -99.62%  -41.23%  -99.79%  -99.98%
Separated season longitude     11    12    170  -99.88%  -83.02%  -88.95%  -53.80%  -84.37%  -98.83%  -82.07%  -95.65%  -97.85%  -77.11%  -99.40%  -46.16%  -99.44%  -99.59%
```

Leatherback turtle take reduction bin # 17 (-80% to -85%)
3 best of 4485 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	12	36	-92.01%	-83.02%	-88.88%	-79.11%	-83.66%	-81.78%	-86.39%	-89.72%	-76.66%	-78.70%	-88.71%	-50.22%	-80.50%	-83.72%
Separated season box	11	12	147036	-91.48%	-83.02%	-88.98%	-73.38%	-80.87%	-82.14%	-86.33%	-87.87%	-77.23%	-76.38%	-89.07%	-47.44%	-81.29%	-83.86%
Separated season box	11	12	146036	-91.48%	-83.02%	-88.99%	-73.41%	-80.85%	-82.14%	-86.35%	-87.84%	-77.24%	-76.37%	-89.07%	-47.48%	-81.29%	-83.86%

Leatherback turtle take reduction bin # 17 (-80% to -85%)
3 best of 4485 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	12	163030	-92.34%	-83.02%	-88.74%	-81.76%	-84.53%	-81.14%	-85.02%	-91.43%	-76.31%	-79.93%	-88.74%	-47.42%	-80.12%	-83.83%
Separated season box	11	12	163031	-92.33%	-83.02%	-88.76%	-81.64%	-84.52%	-81.17%	-85.03%	-91.18%	-76.24%	-79.18%	-88.64%	-46.73%	-79.93%	-83.79%
Separated season box	11	12	163032	-92.30%	-83.02%	-88.78%	-81.47%	-84.55%	-81.20%	-85.01%	-90.91%	-76.26%	-78.87%	-88.65%	-46.19%	-79.93%	-83.76%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
3 best of 3965 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	6	12	21	-80.98%	-48.02%	-65.37%	-99.86%	-77.15%	2.01%	-61.12%	-94.46%	-63.40%	-64.28%	-29.97%	-51.49%	-75.70%	-54.10%
Separated season latitude	11	5	21	-96.29%	-81.83%	-81.97%	-99.97%	-76.07%	-75.39%	-86.06%	-97.41%	-90.02%	-90.49%	-91.00%	-57.16%	-91.81%	-89.67%
Separated season latitude	11	5	22	-95.52%	-81.83%	-81.89%	-99.80%	-76.04%	-76.65%	-86.27%	-97.41%	-89.40%	-89.20%	-90.86%	-57.40%	-91.00%	-86.36%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
3 best of 3965 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	7	5	173	-99.10%	-44.96%	-50.23%	-52.66%	-79.99%	-92.14%	7.59%	-68.62%	-93.04%	-88.76%	-94.56%	-50.23%	-94.35%	-99.98%
Separated season longitude	8	3	171	-99.19%	-55.75%	-49.51%	6.71%	-79.06%	-95.02%	-45.37%	-86.18%	-92.42%	-63.75%	-95.13%	-35.76%	-95.00%	-99.74%
Separated season longitude	9	2	170	-99.42%	-64.50%	-64.14%	-6.44%	-79.89%	-92.21%	-43.92%	-84.63%	-88.32%	-65.59%	-95.40%	-40.69%	-97.77%	-99.58%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
3 best of 3965 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	5	24	-95.17%	-81.83%	-82.07%	-99.01%	-75.47%	-81.22%	-87.06%	-96.59%	-87.81%	-87.90%	-90.07%	-57.22%	-87.11%	-84.32%
Separated season box	11	12	166039	-91.33%	-83.02%	-88.98%	-73.50%	-78.66%	-82.26%	-86.76%	-87.71%	-77.32%	-76.52%	-89.12%	-47.75%	-81.49%	-83.86%
Separated season box	11	12	152039	-91.33%	-83.02%	-88.99%	-73.50%	-78.66%	-82.26%	-86.76%	-87.68%	-77.32%	-76.46%	-89.12%	-47.71%	-81.49%	-83.86%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
3 best of 3965 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	162021	-93.83%	-82.54%	-76.70%	-85.80%	-79.60%	-83.63%	-81.80%	-82.33%	-71.89%	-83.11%	-77.36%	-46.03%	-85.01%	-82.44%
Separated season box	11	1	162022	-93.56%	-82.54%	-77.25%	-85.99%	-79.64%	-83.79%	-82.08%	-83.84%	-71.21%	-80.36%	-78.56%	-46.43%	-84.85%	-79.29%
Separated season box	11	1	162023	-93.33%	-82.54%	-77.62%	-86.35%	-79.80%	-83.89%	-82.40%	-84.66%	-70.53%	-77.19%	-79.55%	-46.42%	-81.62%	-77.33%

Leatherback turtle take reduction bin # 15 (-70% to -75%)
3 best of 4145 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	6	21	-95.84%	-81.74%	-83.04%	-100.00%	-74.12%	-73.64%	-83.02%	-96.84%	-90.25%	-86.88%	-86.75%	-56.37%	-96.92%	-90.80%
Separated season latitude	11	6	22	-95.52%	-81.74%	-83.31%	-100.00%	-73.88%	-74.12%	-82.92%	-96.75%	-90.11%	-85.56%	-86.48%	-56.44%	-95.92%	-88.73%
Separated season latitude	11	6	24	-94.44%	-81.74%	-82.19%	-100.00%	-71.97%	-77.53%	-84.15%	-93.66%	-89.85%	-83.93%	-87.47%	-55.98%	-94.79%	-84.62%

						Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	5	169	-99.03%	-81.83%	-75.58%	-83.01%	-74.35%	-88.94%	-53.96%	-84.06%	-97.29%	-93.43%	-95.04%	-58.06%	-93.27%	-96.93%
Separated season longitude	11	5	167	-98.47%	-81.83%	-75.18%	-80.86%	-73.35%	-88.49%	-61.35%	-80.61%	-94.79%	-83.43%	-94.01%	-58.23%	-90.30%	-90.02%
Separated season longitude	11	5	166	-98.19%	-81.83%	-76.04%	-81.20%	-73.60%	-87.91%	-63.15%	-81.65%	-94.53%	-84.17%	-94.13%	-57.08%	-89.69%	-90.44%

Leatherback turtle take reduction bin # 15 (-70% to -75%)
3 best of 4145 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	150035	-91.13%	-82.54%	-78.12%	-90.36%	-71.26%	-84.84%	-86.20%	-79.90%	-68.03%	-72.33%	-78.62%	-41.91%	-81.57%	-77.62%
Separated season box	11	1	149035	-91.10%	-82.54%	-78.14%	-90.38%	-71.08%	-84.85%	-86.22%	-79.87%	-68.05%	-72.26%	-78.63%	-41.60%	-81.61%	-77.62%
Separated season box	11	1	148035	-91.02%	-82.54%	-78.12%	-90.49%	-70.29%	-84.88%	-86.34%	-79.53%	-68.12%	-72.06%	-78.66%	-41.52%	-81.68%	-77.61%

Leatherback turtle take reduction bin # 15 (-70% to -75%)
3 best of 4145 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	146025	-91.40%	-82.54%	-78.25%	-90.49%	-74.35%	-84.55%	-85.66%	-80.27%	-68.20%	-72.15%	-78.60%	-40.97%	-81.69%	-77.57%
Separated season box	11	1	147033	-91.43%	-82.54%	-78.16%	-90.75%	-74.82%	-84.52%	-85.56%	-80.21%	-68.10%	-72.09%	-78.57%	-40.78%	-81.63%	-77.56%
Separated season box	11	1	148034	-91.38%	-82.54%	-78.07%	-90.43%	-74.65%	-84.63%	-85.63%	-80.20%	-68.02%	-72.06%	-78.54%	-40.91%	-81.59%	-77.57%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
3 best of 4977 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	6	158022	-92.47%	-81.74%	-81.34%	-100.00%	-67.10%	-81.45%	-75.79%	-85.94%	-89.68%	-84.87%	-85.32%	-56.41%	-88.74%	-87.54%
Separated season box	11	6	166027	-90.61%	-81.74%	-81.03%	-100.00%	-66.83%	-81.23%	-80.37%	-86.23%	-89.01%	-84.39%	-86.02%	-56.47%	-89.42%	-85.24%
Separated season box	11	6	173029	-90.24%	-81.74%	-81.13%	-100.00%	-65.88%	-81.49%	-81.03%	-86.37%	-89.03%	-84.29%	-85.64%	-56.49%	-89.21%	-85.20%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
3 best of 4977 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	6	5	171	-98.31%	-36.49%	-26.14%	18.36%	-66.88%	-88.06%	21.37%	-57.72%	-89.19%	-60.07%	-90.72%	-31.35%	-91.26%	-96.73%
Separated season box	11	5	166030	-90.35%	-81.83%	-79.18%	-85.43%	-65.00%	-86.03%	-81.64%	-80.24%	-89.09%	-85.01%	-87.89%	-55.84%	-78.93%	-85.14%
Separated season box	11	5	164030	-90.35%	-81.83%	-79.20%	-85.43%	-65.00%	-86.03%	-81.64%	-80.00%	-89.06%	-84.93%	-87.81%	-55.84%	-78.78%	-85.14%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
3 best of 4977 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	148039	-90.79%	-82.54%	-78.25%	-90.31%	-68.33%	-84.96%	-86.66%	-78.84%	-68.30%	-72.21%	-78.80%	-40.11%	-81.80%	-77.63%
Separated season box	11	1	147039	-90.79%	-82.54%	-78.25%	-90.31%	-68.33%	-84.96%	-86.66%	-78.78%	-68.30%	-72.20%	-78.81%	-40.09%	-81.80%	-77.63%
Separated season box	11	1	146039	-90.79%	-82.54%	-78.25%	-90.31%	-68.33%	-84.96%	-86.66%	-78.77%	-68.30%	-72.20%	-78.80%	-40.08%	-81.80%	-77.63%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
3 best of 4977 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	147035	-90.96%	-82.54%	-78.14%	-90.55%	-69.90%	-84.89%	-86.42%	-79.18%	-68.20%	-72.15%	-78.72%	-40.58%	-81.73%	-77.62%
Separated season box	11	1	146035	-90.94%	-82.54%	-78.15%	-90.48%	-69.60%	-84.91%	-86.46%	-79.09%	-68.23%	-72.22%	-78.74%	-39.58%	-81.78%	-77.62%
Separated season box	11	1	152036	-90.89%	-82.54%	-78.20%	-90.53%	-69.57%	-84.90%	-86.54%	-79.09%	-68.25%	-72.22%	-78.76%	-41.40%	-81.75%	-77.62%

```
Leatherback turtle take reduction bin # 13 ( -60% to -65%)
 3 best of 3720 scenarios at this take level with maximum loggerhead turtle take reduction
==========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat      FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==========================================================================================================================================================================================
Separated season box            11       6 148029   -89.94%  -81.74%  -81.31% -100.00%  -64.42%  -81.83%  -81.67%  -83.69%  -88.51%  -83.28%  -84.61%  -56.17%  -86.26%  -85.07%
Separated season box            11       6 170035   -89.92%  -81.74%  -81.32% -100.00%  -64.20%  -81.86%  -81.75%  -83.65%  -88.53%  -83.30%  -84.61%  -56.20%  -86.22%  -85.07%
Separated season box            11       6 169038   -89.92%  -81.74%  -81.32% -100.00%  -64.20%  -81.86%  -81.75%  -83.31%  -88.45%  -83.26%  -84.51%  -56.18%  -86.00%  -85.06%

Leatherback turtle take reduction bin # 13 ( -60% to -65%)
 3 best of 3720 scenarios at this take level with maximum olive ridley turtle take reduction
==========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat      FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==========================================================================================================================================================================================
Separated season longitude      11       6    172   -99.36%  -81.74%  -83.16%  -99.98%  -62.38%  -88.91%  -53.70%  -88.89%  -98.01%  -97.26%  -91.12%  -60.00%  -94.68%  -98.63%
Separated season longitude      11       6    171   -99.29%  -81.74%  -83.18%  -99.98%  -62.25%  -89.00%  -55.74%  -88.99%  -98.08%  -97.27%  -90.96%  -60.00%  -94.00%  -95.99%
Separated season longitude      11       6    170   -99.20%  -81.74%  -82.96%  -99.99%  -64.15%  -90.32%  -56.84%  -89.34%  -98.01%  -97.04%  -92.46%  -60.00%  -93.97%  -95.92%

Leatherback turtle take reduction bin # 13 ( -60% to -65%)
 3 best of 3720 scenarios at this take level with maximum green turtle take reduction
==========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat      FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==========================================================================================================================================================================================
Separated season box            11       5 165034   -90.01%  -81.83%  -79.12%  -85.51%  -64.06%  -86.10%  -82.14%  -78.11%  -88.88%  -84.73%  -87.03%  -55.36%  -77.59%  -85.19%
Separated season box            11       5 146036   -90.01%  -81.83%  -79.12%  -85.51%  -64.06%  -86.10%  -82.14%  -77.48%  -88.82%  -84.63%  -86.87%  -55.31%  -77.10%  -85.18%
Separated season box            11       5 154039   -90.01%  -81.83%  -79.12%  -85.51%  -64.06%  -86.10%  -82.14%  -77.46%  -88.82%  -84.63%  -86.87%  -55.31%  -77.08%  -85.18%

Leatherback turtle take reduction bin # 13 ( -60% to -65%)
 3 best of 3720 scenarios at this take level with maximum aggregate turtle take reduction
==========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat      FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==========================================================================================================================================================================================
Separated season latitude       11       5     30   -90.39%  -81.83%  -79.24%  -85.49%  -64.99%  -86.02%  -81.90%  -82.15%  -89.13%  -85.28%  -88.17%  -56.16%  -79.21%  -84.91%
Separated season box            11       5 150029   -90.28%  -81.83%  -79.20%  -85.67%  -64.95%  -86.05%  -81.66%  -78.38%  -88.94%  -84.66%  -87.13%  -55.39%  -77.56%  -85.15%
Separated season box            11       5 173030   -90.36%  -81.83%  -79.21%  -85.43%  -64.99%  -86.03%  -81.65%  -81.25%  -89.10%  -85.19%  -88.06%  -56.15%  -79.09%  -84.98%

Leatherback turtle take reduction bin # 12 ( -55% to -60%)
 3 best of 3870 scenarios at this take level with maximum loggerhead turtle take reduction
==========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat      FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==========================================================================================================================================================================================
Separated season latitude       10       7     31   -81.66%  -73.34%  -74.01%  -99.99%  -59.82%  -71.27%  -66.22%  -76.23%  -85.17%  -71.49%  -77.34%  -54.66%  -84.78%  -77.55%
Separated season latitude       10       7     32   -81.57%  -73.34%  -74.05%  -99.99%  -59.51%  -71.33%  -66.26%  -75.76%  -85.08%  -71.38%  -77.18%  -54.64%  -84.27%  -77.52%
Separated season latitude       10       7     33   -81.54%  -73.34%  -74.07%  -99.99%  -59.45%  -71.35%  -65.47%  -75.44%  -85.02%  -71.33%  -77.08%  -54.63%  -84.04%  -77.51%

Leatherback turtle take reduction bin # 12 ( -55% to -60%)
 3 best of 3870 scenarios at this take level with maximum olive ridley turtle take reduction
==========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat      FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==========================================================================================================================================================================================
Separated season longitude      10       6    173   -99.30%  -71.94%  -69.32%  -88.02%  -58.85%  -89.64%  -18.82%  -78.37%  -97.24%  -96.82%  -89.88%  -60.00%  -93.58%  -98.63%
Separated season longitude      10       6    172   -98.95%  -71.94%  -69.85%  -89.40%  -58.70%  -89.53%  -36.19%  -75.96%  -96.29%  -95.59%  -89.44%  -57.99%  -93.18%  -96.63%
Separated season longitude      10       6    170   -98.45%  -71.94%  -73.14%  -87.71%  -59.45%  -90.47%  -43.26%  -75.99%  -96.05%  -95.54%  -89.24%  -57.92%  -89.61%  -94.92%

Leatherback turtle take reduction bin # 12 ( -55% to -60%)
 3 best of 3870 scenarios at this take level with maximum green turtle take reduction
==========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat      FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==========================================================================================================================================================================================
Separated season latitude       10       6     24   -89.60%  -71.94%  -72.37%  -99.22%  -59.45%  -68.40%  -77.92%  -90.71%  -81.68%  -77.82%  -81.64%  -54.72%  -83.85%  -75.45%
Separated season latitude       10       6     25   -88.25%  -71.94%  -71.78%  -98.92%  -58.70%  -71.25%  -77.13%  -85.42%  -81.61%  -77.93%  -81.10%  -54.64%  -75.06%  -76.23%
Separated season latitude       10       6     26   -86.91%  -71.94%  -71.58%  -98.25%  -56.27%  -72.27%  -77.28%  -84.27%  -81.82%  -77.99%  -80.73%  -54.80%  -72.05%  -76.32%
```

```
Type of management action      #Mn      Ms Lon/Lat     FED       FEL       Rev       Log       Lea       Rid       Gre       Swo       Big       Alb       Yel       Blu       Mah       Opa
=========================================================================================================================================================================================
Season                           8       1       0  -69.73%   -61.02%   -65.62%   -70.77%   -59.33%   -55.67%   -68.69%   -68.01%   -46.24%   -50.04%   -65.14%   -32.43%   -50.01%   -45.81%
Separated season latitude       10       6      24  -89.60%   -71.94%   -72.37%   -99.22%   -59.45%   -68.40%   -77.92%   -90.71%   -81.68%   -77.82%   -81.64%   -54.72%   -83.85%   -75.45%
Separated season latitude       10       6      25  -88.25%   -71.94%   -71.78%   -98.92%   -58.70%   -71.25%   -77.13%   -85.42%   -81.61%   -77.93%   -81.10%   -54.64%   -75.06%   -76.23%

Leatherback turtle take reduction bin # 11 ( -50% to -55%)
 3 best of 3393 scenarios at this take level with maximum loggerhead turtle take reduction
=========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat     FED       FEL       Rev       Log       Lea       Rid       Gre       Swo       Big       Alb       Yel       Blu       Mah       Opa
=========================================================================================================================================================================================
Separated season latitude        5      11      21  -76.71%   -36.98%   -49.95%   -99.85%   -51.52%    18.50%   -51.38%   -89.55%   -60.50%   -53.10%   -20.37%   -48.76%   -75.84%   -49.86%
Separated season latitude        6      10      21  -78.97%   -44.63%   -55.21%   -99.85%   -53.36%    44.17%   -54.56%   -89.98%   -68.80%   -56.28%   -25.06%   -48.74%   -82.21%   -59.41%
Separated season latitude        7       9      21  -81.11%   -50.24%   -58.03%   -99.84%   -54.35%   -24.77%   -58.01%   -90.18%   -72.17%   -58.86%   -33.04%   -50.01%   -85.23%   -65.71%

Leatherback turtle take reduction bin # 11 ( -50% to -55%)
 3 best of 3393 scenarios at this take level with maximum olive ridley turtle take reduction
=========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat     FED       FEL       Rev       Log       Lea       Rid       Gre       Swo       Big       Alb       Yel       Blu       Mah       Opa
=========================================================================================================================================================================================
Separated season longitude       5       6     173  -98.50%   -26.96%   -41.90%   -51.89%   -53.66%   -83.90%    40.64%   -56.76%   -90.94%   -82.10%   -85.60%   -40.00%   -89.02%   -98.61%
Separated season longitude       6       6     171  -97.70%   -35.31%   -21.54%   -22.20%   -53.05%   -81.01%    37.04%   -51.94%   -88.24%   -79.08%   -82.10%   -48.83%   -85.68%   -92.76%
Separated season longitude       7       6     171  -97.72%   -44.22%   -32.69%   -17.35%   -54.22%   -80.98%    40.17%   -55.14%   -91.40%   -81.41%   -82.55%   -48.24%   -89.07%   -92.80%

Leatherback turtle take reduction bin # 11 ( -50% to -55%)
 3 best of 3393 scenarios at this take level with maximum green turtle take reduction
=========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat     FED       FEL       Rev       Log       Lea       Rid       Gre       Swo       Big       Alb       Yel       Blu       Mah       Opa
=========================================================================================================================================================================================
Separated season latitude        9       7      24  -84.61%   -63.55%   -65.97%   -99.22%   -54.42%   -57.52%   -68.88%   -85.23%   -78.32%   -64.44%   -69.93%   -53.60%   -81.64%   -67.29%
Separated season latitude       10       6      27  -85.63%   -71.94%   -70.79%   -95.53%   -54.04%   -73.46%   -75.30%   -82.55%   -82.12%   -78.13%   -80.24%   -54.59%   -70.26%   -76.50%
Separated season latitude       10       6      28  -84.27%   -71.94%   -70.29%   -92.91%   -51.51%   -74.32%   -72.45%   -80.44%   -82.41%   -78.22%   -80.17%   -54.50%   -69.71%   -76.68%

Leatherback turtle take reduction bin # 11 ( -50% to -55%)
 3 best of 3393 scenarios at this take level with maximum aggregate turtle take reduction
=========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat     FED       FEL       Rev       Log       Lea       Rid       Gre       Swo       Big       Alb       Yel       Blu       Mah       Opa
=========================================================================================================================================================================================
Separated season latitude       10       6      27  -85.63%   -71.94%   -70.79%   -95.53%   -54.04%   -73.46%   -75.30%   -82.55%   -82.12%   -78.13%   -80.24%   -54.59%   -70.26%   -76.50%
Separated season box            10       6 166025  -85.69%   -71.94%   -69.48%   -88.01%   -53.63%   -74.36%   -61.34%   -74.07%   -82.60%   -77.42%   -80.65%   -53.25%   -80.39%   -77.66%
Separated season box            10       6 163025  -85.05%   -71.94%   -69.49%   -87.58%   -52.97%   -74.52%   -62.56%   -73.02%   -82.72%   -76.96%   -79.89%   -53.29%   -79.16%   -77.69%

Leatherback turtle take reduction bin # 10 ( -45% to -50%)
 3 best of 3650 scenarios at this take level with maximum loggerhead turtle take reduction
=========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat     FED       FEL       Rev       Log       Lea       Rid       Gre       Swo       Big       Alb       Yel       Blu       Mah       Opa
=========================================================================================================================================================================================
Separated season latitude        2       1      21  -65.63%    -9.20%   -12.36%   -99.70%   -46.30%    45.61%   -34.42%   -83.60%   -19.99%   -42.34%    12.76%   -36.75%   -38.79%   -23.00%
Separated season latitude        4      12      21  -73.11%   -28.17%   -45.11%   -99.83%   -47.49%    29.80%   -46.02%   -89.17%   -48.47%   -50.50%   -13.47%   -47.37%   -65.59%   -41.46%
Separated season latitude        4      12      22  -68.04%   -28.17%   -43.43%   -99.63%   -47.13%    26.41%   -45.92%   -88.97%   -46.16%   -44.89%   -16.39%   -48.26%   -61.96%   -31.01%

Leatherback turtle take reduction bin # 10 ( -45% to -50%)
 3 best of 3650 scenarios at this take level with maximum olive ridley turtle take reduction
=========================================================================================================================================================================================
Type of management action      #Mn      Ms Lon/Lat     FED       FEL       Rev       Log       Lea       Rid       Gre       Swo       Big       Alb       Yel       Blu       Mah       Opa
=========================================================================================================================================================================================
Separated season box            10       6 149029  -80.21%   -71.94%   -69.37%   -88.65%   -45.15%   -75.52%   -71.58%   -69.38%   -82.76%   -75.49%   -78.14%   -53.45%   -71.41%   -77.46%
Separated season box            10       6 151030  -80.13%   -71.94%   -69.37%   -88.49%   -45.04%   -75.53%   -71.72%   -69.64%   -82.78%   -75.45%   -78.24%   -53.61%   -71.49%   -77.48%
Separated season box            10       6 150030  -80.10%   -71.94%   -69.37%   -88.51%   -45.00%   -75.54%   -71.77%   -69.52%   -82.78%   -75.46%   -78.20%   -53.63%   -71.50%   -77.47%
```

Leatherback turtle take reduction bin # 10 (-45% to -50%)
3 best of 3650 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	10	6	30	-80.45%	-71.94%	-69.39%	-88.50%	-45.51%	-75.42%	-71.70%	-73.03%	-83.05%	-76.16%	-79.26%	-54.36%	-73.20%	-77.27%
Separated season box	10	6	151030	-80.13%	-71.94%	-69.37%	-88.49%	-45.04%	-75.53%	-71.72%	-69.64%	-82.78%	-75.45%	-78.24%	-53.61%	-71.49%	-77.48%
Separated season box	10	6	150030	-80.10%	-71.94%	-69.37%	-88.51%	-45.00%	-75.54%	-71.77%	-69.52%	-82.78%	-75.46%	-78.20%	-53.63%	-71.50%	-77.47%

Leatherback turtle take reduction bin # 10 (-45% to -50%)
3 best of 3650 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	10	6	156025	-82.80%	-71.94%	-69.50%	-88.04%	-49.78%	-75.15%	-67.04%	-71.17%	-82.94%	-75.96%	-78.64%	-53.66%	-73.86%	-77.56%
Separated season box	10	6	157026	-82.68%	-71.94%	-69.43%	-88.13%	-49.99%	-74.89%	-66.92%	-71.33%	-82.66%	-76.05%	-78.60%	-53.67%	-73.41%	-77.40%
Separated season box	10	6	157027	-82.43%	-71.94%	-69.43%	-88.34%	-49.81%	-74.95%	-67.37%	-71.25%	-82.57%	-76.07%	-78.51%	-53.74%	-72.96%	-77.38%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
3 best of 4035 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	1	22	-58.27%	-9.20%	-18.67%	-99.43%	-44.95%	44.38%	-32.59%	-83.60%	-17.04%	-33.46%	8.48%	-40.60%	-36.61%	-8.67%
Separated season latitude	3	1	21	-69.57%	-18.90%	-32.65%	-99.81%	-41.66%	38.53%	-39.26%	-86.43%	-29.49%	-45.09%	3.87%	-37.75%	-49.93%	-28.59%
Separated season latitude	3	1	22	-62.65%	-18.90%	-27.49%	-99.57%	-40.20%	37.68%	-37.26%	-86.61%	-26.70%	-35.95%	-0.51%	-41.46%	-47.81%	-15.04%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
3 best of 4035 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	5	6	171	-97.60%	-26.96%	-18.18%	13.74%	-42.64%	-80.55%	48.55%	-47.73%	-87.33%	-57.32%	-81.80%	-31.49%	-85.46%	-92.74%
Separated season longitude	5	6	170	-97.19%	-26.96%	-17.64%	35.00%	-42.60%	-77.69%	53.52%	-39.91%	-76.98%	-51.47%	-79.20%	-36.85%	-83.97%	-90.14%
Separated season longitude	11	8	169	-98.55%	-84.16%	-86.48%	-81.75%	-42.89%	-78.53%	-61.19%	-88.48%	-97.13%	-92.96%	-97.65%	-59.58%	-96.38%	-95.95%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
3 best of 4035 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Season	10	6	0	-79.93%	-71.94%	-69.36%	-88.52%	-44.20%	-75.60%	-72.05%	-68.64%	-82.65%	-75.45%	-77.96%	-53.47%	-70.99%	-77.46%
Separated season box	10	6	173036	-79.93%	-71.94%	-69.36%	-88.52%	-44.20%	-75.60%	-72.05%	-69.14%	-82.72%	-75.55%	-78.10%	-53.49%	-71.33%	-77.48%
Separated season box	10	6	153037	-79.93%	-71.94%	-69.36%	-88.52%	-44.20%	-75.60%	-72.05%	-68.71%	-82.66%	-75.46%	-77.98%	-53.47%	-71.04%	-77.47%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
3 best of 4035 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	6	148	-80.14%	-71.94%	-69.36%	-88.59%	-44.81%	-75.53%	-71.70%	-69.27%	-82.76%	-75.48%	-78.10%	-53.48%	-71.43%	-77.47%
Separated season box	10	6	148022	-80.14%	-71.94%	-69.36%	-88.59%	-44.81%	-75.53%	-71.70%	-69.26%	-82.76%	-75.48%	-78.10%	-53.48%	-71.43%	-77.46%
Separated season box	10	6	149030	-80.08%	-71.94%	-69.37%	-88.51%	-44.90%	-75.55%	-71.80%	-69.37%	-82.77%	-75.46%	-78.11%	-53.49%	-71.43%	-77.47%

Leatherback turtle take reduction bin # 8 (-35% to -40%)
3 best of 5630 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	2	21	-66.13%	-9.40%	-23.18%	-99.35%	-39.04%	46.63%	-34.64%	-86.10%	-16.58%	-43.48%	17.95%	-31.38%	-42.92%	-22.90%
Separated season latitude	3	1	23	-59.05%	-18.90%	-27.28%	-99.26%	-39.59%	37.34%	-34.77%	-84.01%	-23.55%	-25.81%	-8.56%	-42.34%	-40.64%	-4.93%
Merged season latitude	11	6	21	-52.92%	0.00%	-5.04%	-99.09%	-38.30%	49.23%	-27.27%	-75.95%	-3.71%	-39.99%	29.07%	-29.00%	-21.89%	-13.25%

```
Type of management action    #Mn     Ms Lon/Lat     FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season longitude     4      7     171  -96.32%  -18.95%  -11.08%   11.86%  -37.91%  -69.69%   93.35%  -36.26%  -85.85%  -56.00%  -79.68%  -31.29%  -82.70%  -92.34%
Separated season longitude     8     10     171  -96.61%  -64.42%  -66.99%  -60.47%  -37.73%  -68.20%    7.16%  -69.07%  -94.45%  -94.58%  -95.41%  -56.04%  -89.60%  -95.77%
Separated season longitude    10      9     170  -97.96%  -78.40%  -82.59%  -55.05%  -37.60%  -75.66%  -50.73%  -83.18%  -95.75%  -95.75%  -98.08%  -57.95%  -92.49%  -97.15%

Leatherback turtle take reduction bin # 8 ( -35% to -40%)
 3 best of 5630 scenarios at this take level with maximum green turtle take reduction
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action    #Mn     Ms Lon/Lat     FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season latitude      9      7      31  -71.71%  -63.55%  -62.09%  -88.64%  -39.87%  -65.05%  -56.69%  -62.47%  -79.32%  -63.90%  -70.98%  -52.14%  -70.18%  -69.94%
Separated season latitude      9      7      32  -71.59%  -63.55%  -62.12%  -88.62%  -39.48%  -65.10%  -56.76%  -61.82%  -79.25%  -63.75%  -70.78%  -52.00%  -69.72%  -69.93%
Separated season latitude      9      7      33  -71.56%  -63.55%  -62.14%  -88.62%  -39.42%  -65.12%  -55.98%  -61.41%  -79.19%  -63.68%  -70.67%  -51.97%  -69.43%  -69.91%

Leatherback turtle take reduction bin # 8 ( -35% to -40%)
 3 best of 5630 scenarios at this take level with maximum aggregate turtle take reduction
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action    #Mn     Ms Lon/Lat     FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season latitude      7      7      34  -52.74%  -45.17%  -39.38%  -52.79%  -39.82%  -54.06%  -39.34%  -38.94%  -59.51%  -52.32%  -49.71%  -34.68%  -53.89%  -57.85%
Separated season latitude      7      7      35  -52.73%  -45.17%  -39.38%  -52.78%  -39.81%  -54.07%  -39.34%  -38.62%  -59.42%  -52.26%  -49.58%  -34.58%  -53.75%  -57.84%
Separated season latitude      7      7      36  -52.71%  -45.17%  -39.37%  -52.78%  -39.71%  -54.09%  -39.30%  -38.34%  -59.35%  -52.19%  -49.48%  -34.48%  -53.63%  -57.83%

Leatherback turtle take reduction bin # 7 ( -30% to -35%)
 3 best of 5360 scenarios at this take level with maximum loggerhead turtle take reduction
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action    #Mn     Ms Lon/Lat     FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season latitude      2      2      24  -48.69%   -9.40%  -19.97%  -95.23%  -34.14%   35.33%  -35.03%  -73.78%   -7.85%  -20.28%    1.60%  -34.53%  -22.54%    2.07%
Separated season latitude      3      1      26  -47.67%  -18.90%  -24.81%  -96.33%  -32.24%    8.41%  -38.09%  -60.71%  -20.93%  -22.99%  -15.18%  -41.50%  -17.67%   -5.94%
Merged season latitude         9      8      21  -45.03%    0.00%   -4.35%  -94.91%  -34.00%   44.94%  -19.06%  -64.62%   -3.94%  -41.51%   10.50%  -28.12%  -15.64%  -14.15%

Leatherback turtle take reduction bin # 7 ( -30% to -35%)
 3 best of 5360 scenarios at this take level with maximum olive ridley turtle take reduction
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action    #Mn     Ms Lon/Lat     FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season longitude     6     12     172  -96.64%  -48.02%  -52.26%  -51.38%  -30.18%  -63.87%   29.10%  -68.35%  -94.30%  -91.87%  -96.71%  -46.11%  -89.08%  -97.35%
Separated season longitude     8     10     172  -96.82%  -64.42%  -72.95%  -57.73%  -34.10%  -71.04%    7.88%  -72.03%  -95.23%  -97.08%  -97.30%  -55.10%  -89.46%  -97.37%
Separated season longitude     9     10     170  -97.73%  -72.94%  -74.72%  -60.50%  -31.46%  -75.20%  -43.17%  -80.50%  -94.22%  -95.34%  -97.51%  -56.93%  -88.35%  -95.55%

Leatherback turtle take reduction bin # 7 ( -30% to -35%)
 3 best of 5360 scenarios at this take level with maximum green turtle take reduction
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action    #Mn     Ms Lon/Lat     FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season latitude      8      8      30  -65.51%  -56.06%  -57.37%  -86.37%  -34.19%  -51.84%  -48.20%  -60.46%  -75.63%  -57.11%  -59.27%  -51.09%  -66.51%  -64.03%
Separated season latitude      8      8      31  -64.75%  -56.06%  -57.29%  -86.13%  -33.10%  -52.14%  -47.75%  -58.01%  -75.46%  -56.99%  -59.07%  -50.80%  -65.58%  -64.31%
Separated season latitude      8      8      32  -64.55%  -56.06%  -57.28%  -85.98%  -32.64%  -52.24%  -47.63%  -57.20%  -75.36%  -56.89%  -59.05%  -50.67%  -64.94%  -64.33%

Leatherback turtle take reduction bin # 7 ( -30% to -35%)
 3 best of 5360 scenarios at this take level with maximum aggregate turtle take reduction
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action    #Mn     Ms Lon/Lat     FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season latitude      6      6      31  -47.16%  -35.31%  -22.66%  -46.19%  -32.96%  -47.08%  -34.48%  -34.35%  -25.90%  -43.75%  -28.95%  -26.19%  -35.14%  -41.93%
Separated season box           6      6  173031  -47.06%  -35.31%  -22.75%  -46.36%  -32.69%  -47.21%  -34.32%  -33.48%  -25.82%  -42.16%  -28.87%  -25.95%  -35.18%  -41.95%
Separated season box           6      6  170031  -47.05%  -35.31%  -22.99%  -46.36%  -32.68%  -47.23%  -34.32%  -32.80%  -25.95%  -41.85%  -28.94%  -26.11%  -35.68%  -41.96%
```

Leatherback turtle take reduction bin # 6 (-25% to -30%)
3 best of 5006 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	2	26	-41.05%	-9.40%	-16.16%	-91.14%	-29.73%	14.11%	-31.51%	-58.32%	-7.19%	-19.50%	-1.58%	-34.50%	-8.77%	0.49%
Separated season latitude	3	1	27	-44.73%	-18.90%	-22.48%	-92.76%	-29.04%	1.65%	-32.50%	-57.22%	-19.24%	-23.38%	-16.77%	-38.00%	-14.05%	-6.51%
Merged season latitude	9	7	21	-42.04%	0.00%	-2.83%	-90.33%	-29.30%	40.94%	-21.46%	-57.87%	-5.92%	-40.05%	20.38%	-27.93%	-12.57%	-13.81%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
3 best of 5006 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	8	9	170	-95.78%	-60.02%	-62.85%	-59.98%	-25.50%	-64.46%	8.46%	-62.16%	-92.06%	-89.83%	-88.09%	-57.62%	-83.95%	-91.81%
Separated season longitude	8	11	170	-97.59%	-65.39%	-70.91%	-57.04%	-29.57%	-67.99%	-21.10%	-78.33%	-93.15%	-93.60%	-96.71%	-54.26%	-85.33%	-93.97%
Separated season longitude	10	9	171	-98.08%	-78.40%	-83.61%	-52.78%	-28.90%	-77.86%	-53.18%	-82.92%	-96.03%	-96.09%	-97.74%	-57.54%	-92.61%	-96.44%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
3 best of 5006 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	6	6	34	-43.68%	-35.31%	-23.45%	-31.40%	-25.41%	-48.59%	-39.17%	-27.33%	-28.21%	-39.87%	-30.91%	-15.06%	-38.50%	-42.33%
Separated season box	6	6	173034	-43.68%	-35.31%	-23.43%	-31.41%	-25.43%	-48.59%	-39.12%	-26.95%	-28.11%	-39.42%	-30.85%	-14.95%	-38.39%	-42.32%
Separated season longitude	10	9	171	-98.08%	-78.40%	-83.61%	-52.78%	-28.90%	-77.86%	-53.18%	-82.92%	-96.03%	-96.09%	-97.74%	-57.54%	-92.61%	-96.44%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
3 best of 5006 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	6	6	159031	-46.31%	-35.31%	-23.82%	-38.71%	-29.99%	-48.18%	-34.22%	-27.44%	-27.56%	-39.65%	-29.79%	-18.45%	-36.24%	-42.18%
Separated season box	6	6	164032	-45.40%	-35.31%	-23.30%	-38.67%	-29.87%	-48.09%	-35.76%	-28.78%	-27.27%	-40.32%	-29.62%	-19.93%	-37.18%	-42.16%
Separated season longitude	10	9	171	-98.08%	-78.40%	-83.61%	-52.78%	-28.90%	-77.86%	-53.18%	-82.92%	-96.03%	-96.09%	-97.74%	-57.54%	-92.61%	-96.44%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
3 best of 5955 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	3	1	29	-38.62%	-18.90%	-21.13%	-85.22%	-22.01%	-1.94%	-22.57%	-48.67%	-17.66%	-24.13%	-19.98%	-36.70%	-10.87%	-8.98%
Separated season longitude	9	8	169	-96.16%	-65.83%	-65.76%	-86.27%	-23.70%	-61.72%	-3.74%	-66.04%	-90.52%	-76.22%	-84.16%	-59.22%	-85.73%	-81.41%
Separated season longitude	10	8	170	-97.26%	-75.73%	-77.15%	-86.25%	-24.69%	-71.45%	-21.75%	-77.13%	-95.27%	-95.97%	-96.53%	-59.23%	-93.33%	-97.06%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
3 best of 5955 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	9	10	171	-97.89%	-72.94%	-75.35%	-56.13%	-21.54%	-76.95%	-42.61%	-80.35%	-95.91%	-95.97%	-97.55%	-56.46%	-92.42%	-96.39%
Separated season longitude	10	8	170	-97.26%	-75.73%	-77.15%	-86.25%	-24.69%	-71.45%	-21.75%	-77.13%	-95.27%	-95.97%	-96.53%	-59.23%	-93.33%	-97.06%
Separated season longitude	10	9	172	-98.19%	-78.40%	-84.47%	-51.13%	-23.03%	-78.40%	-51.54%	-83.57%	-96.24%	-98.59%	-98.79%	-56.80%	-92.58%	-98.02%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
3 best of 5955 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	6	6	149035	-42.74%	-35.31%	-23.72%	-28.84%	-20.04%	-49.06%	-39.78%	-24.77%	-28.47%	-38.21%	-31.18%	-12.54%	-38.34%	-42.37%
Separated season longitude	9	10	171	-97.89%	-72.94%	-75.35%	-56.13%	-21.54%	-76.95%	-42.61%	-80.35%	-95.91%	-95.97%	-97.55%	-56.46%	-92.42%	-96.39%
Separated season longitude	10	9	172	-98.19%	-78.40%	-84.47%	-51.13%	-23.03%	-78.40%	-51.54%	-83.57%	-96.24%	-98.59%	-98.79%	-56.80%	-92.58%	-98.02%

```
Type of management action     #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================================================
Separated season box            5     6 169033  -37.44%  -26.96%  -20.08%  -31.06%  -24.89%  -37.24%  -29.92%  -25.01%  -14.66%  -30.39%  -24.61%  -12.31%  -25.44%  -32.51%
Separated season box            5     6 168033  -37.41%  -26.96%  -20.11%  -30.77%  -24.88%  -37.30%  -29.96%  -24.84%  -14.76%  -30.56%  -24.63%  -11.62%  -25.51%  -32.53%
Separated season box            5     6 167033  -37.40%  -26.96%  -20.18%  -30.43%  -24.80%  -37.33%  -29.93%  -24.74%  -14.88%  -30.28%  -24.71%  -11.89%  -25.63%  -32.54%

Leatherback turtle take reduction bin # 4 ( -15% to -20%)
 3 best of 9396 scenarios at this take level with maximum loggerhead turtle take reduction
==================================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================================================
Separated season latitude       3     1      30  -36.05%  -18.90%  -21.12%  -83.59%  -19.03%   -3.19%  -22.55%  -43.90%  -17.27%  -23.60%  -20.45%  -36.81%  -10.18%  -10.01%
Separated season latitude       3     1      31  -34.80%  -18.90%  -21.35%  -82.61%  -17.40%   -4.11%  -21.62%  -40.16%  -16.46%  -22.97%  -20.51%  -36.21%   -8.10%  -10.79%
Separated season longitude     10     8     171  -97.44%  -75.73%  -80.28%  -86.97%  -16.02%  -71.76%  -16.70%  -77.16%  -95.98%  -97.35%  -97.02%  -59.19%  -93.62%  -97.70%

Leatherback turtle take reduction bin # 4 ( -15% to -20%)
 3 best of 9396 scenarios at this take level with maximum olive ridley turtle take reduction
==================================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================================================
Separated season longitude      9     9     173  -97.38%  -69.94%  -78.89%  -62.30%  -17.86%  -84.39%  -29.81%  -74.24%  -95.62%  -98.45%  -97.35%  -56.08%  -91.12%  -98.79%
Separated season longitude      9    10     172  -98.05%  -72.94%  -81.20%  -53.22%  -15.30%  -79.65%  -43.09%  -81.46%  -96.11%  -98.46%  -98.78%  -55.59%  -92.43%  -97.99%
Separated season longitude     10     8     171  -97.44%  -75.73%  -80.28%  -86.97%  -16.02%  -71.76%  -16.70%  -77.16%  -95.98%  -97.35%  -97.02%  -59.19%  -93.62%  -97.70%

Leatherback turtle take reduction bin # 4 ( -15% to -20%)
 3 best of 9396 scenarios at this take level with maximum green turtle take reduction
==================================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================================================
Separated season box            6     6 168038  -42.39%  -35.31%  -23.79%  -28.52%  -18.56%  -49.13%  -40.08%  -24.34%  -28.69%  -38.34%  -31.37%  -11.74%  -38.53%  -42.38%
Separated season box            6     6 162039  -42.39%  -35.31%  -23.78%  -28.52%  -18.56%  -49.13%  -40.08%  -24.15%  -28.65%  -38.22%  -31.34%  -11.68%  -38.45%  -42.38%
Separated season longitude      9    10     172  -98.05%  -72.94%  -81.20%  -53.22%  -15.30%  -79.65%  -43.09%  -81.46%  -96.11%  -98.46%  -98.78%  -55.59%  -92.43%  -97.99%

Leatherback turtle take reduction bin # 4 ( -15% to -20%)
 3 best of 9396 scenarios at this take level with maximum aggregate turtle take reduction
==================================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================================================
Separated season box            4     6 164034  -29.27%  -19.78%  -15.35%  -20.91%  -19.20%  -27.90%  -26.40%  -19.49%   -8.62%  -22.10%  -22.27%   -5.22%  -14.64%  -19.77%
Separated season box            6     6 148035  -42.66%  -35.31%  -23.70%  -28.90%  -19.53%  -49.08%  -39.84%  -24.59%  -28.51%  -38.11%  -31.20%  -12.49%  -38.37%  -42.36%
Separated season box            6     6 147035  -42.59%  -35.31%  -23.72%  -28.92%  -19.28%  -49.09%  -39.89%  -24.38%  -28.55%  -38.14%  -31.23%  -11.99%  -38.39%  -42.37%

Leatherback turtle take reduction bin # 3 ( -10% to -15%)
 3 best of 14312 scenarios at this take level with maximum loggerhead turtle take reduction
==================================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================================================
Separated season latitude       3     1      33  -33.56%  -18.90%  -22.77%  -78.76%  -13.66%   -6.03%  -20.07%  -35.27%  -17.26%  -17.02%  -21.84%  -33.07%   -5.52%  -11.48%
Separated season longitude     10     8     172  -97.57%  -75.73%  -80.24%  -86.53%  -10.21%  -71.39%  -14.65%  -79.76%  -96.83%  -97.35%  -97.76%  -59.09%  -93.52%  -97.52%
Separated season longitude     11     8     170  -98.63%  -84.16%  -87.97%  -82.02%  -14.13%  -79.84%  -63.52%  -88.61%  -97.13%  -98.99%  -99.15%  -59.67%  -96.37%  -98.52%

Leatherback turtle take reduction bin # 3 ( -10% to -15%)
 3 best of 14312 scenarios at this take level with maximum olive ridley turtle take reduction
==================================================================================================================================================================================
Type of management action     #Mn    Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================================================
Separated season longitude      6     1     172  -97.84%  -47.37%  -57.84%  -47.89%  -11.39%  -72.37%  -23.07%  -74.48%  -91.89%  -90.96%  -97.71%  -47.77%  -88.72%  -97.97%
Separated season longitude      7    12     172  -97.86%  -56.62%  -60.86%  -46.57%  -12.17%  -72.59%  -22.60%  -77.77%  -95.17%  -93.16%  -98.18%  -46.48%  -92.06%  -97.98%
Separated season longitude     11     8     170  -98.63%  -84.16%  -87.97%  -82.02%  -14.13%  -79.84%  -63.52%  -88.61%  -97.13%  -98.99%  -99.15%  -59.67%  -96.37%  -98.52%
```

```
Leatherback turtle take reduction bin # 3 ( -10% to -15%)
 3 best of 14312 scenarios at this take level with maximum green turtle take reduction
==================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================
Separated season box            5      6 147039  -33.70%  -26.96%  -20.74%  -13.77%  -11.04%  -39.36%  -33.67%  -18.85%  -17.20%  -26.16%  -26.38%   -7.73%  -27.86%  -32.92%
Separated season box            5      6 146039  -33.70%  -26.96%  -20.74%  -13.77%  -11.04%  -39.36%  -33.67%  -18.84%  -17.20%  -26.16%  -26.37%   -7.72%  -27.85%  -32.92%
Separated season longitude     11      8    170  -98.63%  -84.16%  -87.97%  -82.02%  -14.13%  -79.84%  -63.52%  -88.61%  -97.13%  -98.99%  -99.15%  -59.67%  -96.37%  -98.52%

Leatherback turtle take reduction bin # 3 ( -10% to -15%)
 3 best of 14312 scenarios at this take level with maximum aggregate turtle take reduction
==================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================
Separated season box            3      6 172035  -23.90%  -14.21%  -10.49%  -18.71%  -14.92%  -19.11%  -19.85%  -16.44%   -5.00%  -20.16%  -17.11%   -4.91%   -4.56%  -11.59%
Separated season box            3      6 171035  -23.84%  -14.21%  -10.50%  -18.77%  -14.79%  -19.27%  -20.26%  -16.24%   -5.03%  -19.94%  -17.11%   -5.12%   -4.72%  -11.59%
Separated season longitude     11      8    170  -98.63%  -84.16%  -87.97%  -82.02%  -14.13%  -79.84%  -63.52%  -88.61%  -97.13%  -98.99%  -99.15%  -59.67%  -96.37%  -98.52%

Leatherback turtle take reduction bin # 2 (  -5% to -10%)
 3 best of 18589 scenarios at this take level with maximum loggerhead turtle take reduction
==================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================
Separated season box            3      1 173034  -32.08%  -18.90%  -22.65%  -64.15%   -8.26%   -9.03%  -14.21%  -29.15%  -19.22%  -14.98%  -23.49%  -24.31%  -10.33%  -12.01%
Separated season box            3      1 172034  -31.97%  -18.90%  -22.64%  -63.96%   -8.05%   -9.18%  -14.28%  -29.12%  -19.28%  -14.74%  -23.53%  -25.37%  -10.53%  -12.02%
Separated season box            3      1 171034  -31.90%  -18.90%  -22.63%  -63.95%   -7.97%   -9.29%  -14.55%  -28.84%  -19.37%  -14.25%  -23.57%  -25.68%  -10.61%  -12.04%

Leatherback turtle take reduction bin # 2 (  -5% to -10%)
 3 best of 18589 scenarios at this take level with maximum olive ridley turtle take reduction
==================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================
Separated season longitude      6     12    173  -97.11%  -48.02%  -71.26%  -52.93%   -6.51%  -77.08%    3.20%  -68.72%  -94.69%  -93.47%  -96.75%  -43.06%  -90.53%  -98.76%
Separated season longitude      7     11    173  -97.18%  -56.83%  -71.79%  -52.52%   -8.55%  -74.19%    9.34%  -70.13%  -95.01%  -97.95%  -96.89%  -52.81%  -90.70%  -98.76%
Separated season longitude      8     10    173  -97.25%  -64.42%  -75.11%  -56.98%   -9.88%  -84.72%  -18.25%  -72.19%  -95.57%  -98.28%  -97.33%  -54.87%  -90.92%  -98.76%

Leatherback turtle take reduction bin # 2 (  -5% to -10%)
 3 best of 18589 scenarios at this take level with maximum green turtle take reduction
==================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================
Season                          3      6      0  -21.32%  -14.21%  -11.10%   -9.98%   -8.60%  -20.72%  -23.10%  -12.83%   -6.54%  -16.64%  -17.98%   -4.18%   -6.82%  -11.78%
Separated season box            3      6 147039  -21.37%  -14.21%  -11.09%   -9.96%   -8.67%  -20.67%  -22.96%  -12.84%   -6.52%  -16.56%  -17.96%   -4.00%   -6.76%  -11.78%
Separated season box            3      6 146039  -21.35%  -14.21%  -11.09%   -9.97%   -8.63%  -20.70%  -23.05%  -12.85%   -6.52%  -16.57%  -17.97%   -4.04%   -6.76%  -11.78%

Leatherback turtle take reduction bin # 2 (  -5% to -10%)
 3 best of 18589 scenarios at this take level with maximum aggregate turtle take reduction
==================================================================================================================================================
Type of management action     #Mn     Ms Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
==================================================================================================================================================
Separated season latitude       3      7     36  -19.58%  -11.96%   -9.20%  -20.39%   -9.97%  -18.15%  -13.97%  -11.80%   -5.89%  -12.32%  -15.07%   -7.87%  -11.99%  -12.92%
Separated season latitude       4      8     35  -27.14%  -19.89%  -12.20%  -25.62%   -8.88%  -26.54%  -15.33%  -13.09%  -21.36%  -21.60%  -12.57%  -11.79%  -31.03%  -29.33%
Separated season box            4      8 148034  -27.37%  -19.89%  -12.16%  -24.28%   -9.93%  -26.56%  -14.59%  -11.31%  -21.12%  -20.03%  -12.27%   -9.85%  -30.22%  -29.26%
```

HLA (with observers)	-16%	-1%	1%	-3%	-3%	1%	-1%	1%	-11%	-1%	0%	5%	1%	0%	0%	-6%	-8%	-3%
HLA (without observers)	-30%	-4%	4%	3%	-9%	3%	0%	3%	-19%	3%	2%	8%	3%	0%	0%	4%	16%	-14%
Hampton	-48%	-19%	7%	-6%	-20%	5%	-2%	8%	-27%	-6%	5%	23%	4%	0%	0%	-13%	-16%	-10%
Hampton*	-81%	-29%	16%	-26%	-72%	23%	57%	12%	-87%	-22%	43%	-5%	17%	-8%	0%	-56%	-76%	-41%
NMFS (with observers)	-41%	-31%	6%	2%	-23%	3%	6%	2%	-17%	-9%	-8%	18%	8%	-2%	0%	-11%	-14%	-22%
NMFS (without observers)	-53%	-40%	7%	0%	-32%	2%	6%	1%	-24%	-13%	-12%	21%	9%	-4%	-2%	-17%	-21%	-27%
Plaintiff	-63%	-78%	-19%	-36%	-63%	-7%	-38%	-18%	-54%	-38%	-35%	-7%	-21%	-27%	-27%	-35%	-29%	-50%
Plaintiff*	-50%	-62%	-16%	-29%	-50%	-6%	-30%	-15%	-43%	-31%	-28%	-6%	-17%	-22%	-22%	-28%	-23%	-40%
Plaintiff**	-41%	-50%	-13%	-24%	-41%	-4%	-25%	-12%	-35%	-25%	-23%	-5%	-14%	-18%	-17%	-23%	-19%	-33%
Court Final (switching)	-77%	-68%	-2%	-32%	-84%	5%	13%	-11%	-74%	-30%	-5%	-23%	-1%	-31%	-20%	-79%	-83%	-48%
Court Final (no switching)	-79%	-69%	-33%	-51%	-86%	-25%	-25%	-40%	-78%	-51%	-37%	-47%	-30%	-51%	-44%	-82%	-84%	-50%
Total gear change only	-91%	-38%	24%	-20%	-93%	30%	48%	17%	-83%	-14%	59%	-3%	25%	-9%	0%	-84%	-92%	-40%
NMFS Combination 1	-70%	-31%	19%	-19%	-80%	24%	61%	12%	-71%	-11%	31%	-4%	21%	-7%	0%	-74%	-81%	-40%
NMFS Combination 2	-90%	-39%	22%	-21%	-93%	27%	67%	15%	-84%	-12%	31%	-1%	26%	-8%	0%	-84%	-91%	-45%
NMFS Combination 3	-54%	-50%	0%	-10%	-37%	-1%	-9%	1%	-32%	-21%	-13%	16%	-3%	-11%	-9%	-23%	-17%	-32%
NMFS Combination 4	-62%	-57%	0%	-12%	-42%	-1%	-10%	1%	-36%	-24%	-14%	16%	-3%	-13%	-10%	-26%	-19%	-36%
Total gear change only*	-100%	-50%	-39%	-43%	-90%	28%	40%	21%	-79%	-9%	55%	12%	24%	-7%	0%	-82%	-90%	-36%
NMFS Combination 5	-98%	-97%	-63%	-85%	-97%	-74%	-74%	-77%	-92%	-86%	-85%	-48%	-78%	-82%	-77%	-100%	-100%	-85%
Total gear change only**	-100%	-76%	-42%	-85%	-91%	17%	23%	10%	-80%	-18%	18%	2%	10%	-20%	-10%	-85%	-91%	-46%
Total gear change only*[n.s.]	-100%	-72%	-64%	-68%	-94%	-15%	-14%	-23%	-86%	-43%	-7%	-27%	-18%	-41%	-36%	-89%	-94%	-36%
Total gear change only**[n.s.]	-100%	-80%	-86%	-80%	-95%	-20%	-23%	-30%	-87%	-48%	-22%	-32%	-24%	-47%	-41%	-90%	-95%	-46%

Impact entry legend

LOG=loggerhead sea turtle, LEA=leatherback sea turtle, RID=olive ridley sea turtle, GRE=green sea turtle, SWO=swordfish, BIG=bigeye tuna, ALB=albacore tuna, YEL=yellowfin tuna, BSH=blue shark, MAK=mako shark, THR=thresher shark, BMA=blue marlin, SMA=striped marlin, REV=fish catch revenue, EFF=net effort change, BLA=black footed albatross, LAY=laysan albatross, FED=fishing effort disruption.

Scenario legend

HLA (with observers) is single year round spatial closure north of 34N and west of 150W

HLA (without observers) is two year round spatial closures: north of 34N and west of 150W, and north of 28N between 168W and 150W

Hampton is July through January closure of areas north of 29N

Hampton* is July through January closure of 29N, with tuna-only fishing allowed in open time/areas.

NMFS (with observers) is no fishing between 30N-44N all year, no fishing between 23N-44N or between 6N-16N in April and May, 20% of lost effort (=636 sets) allowed with observers

NMFS (without observers) is no fishing between 30N-44N all year, no fishing between 23N-44N or between 6N-16N in April and May.

Plaintiff is no fishing north of 29N year around and no fishing in April-July.

Plaintiff* is no fishing north of 29N year around and no fishing in April-July. Observer coverage effort of 20% historical value allowed in all closed time/areas (approximately 1197 sets)

Plaintiff** is no fishing north of 29N year around and no fishing in April-July. Observer coverage effort of 35% historical value allowed in all closed time/areas (approximately 2095 sets)

Court Final (switching) is no fishing north of 28N between 168W and 150W, 370 sets allowed north of 28N either west of 168W or east of 150W with observers, tuna-only fishing south of 28N,
no fishing mid-March through May, displaced swordfish and mixed effort converted to tuna effort

Court Final (no switching) is no fishing north of 28N between 168W and 150W, 370 sets allowed north of 28N either west of 168W or east of 150W with observers, tuna-only fishing south of 28N,
no fishing mid-March through May, displaced swordfish and mixed effort lost.

Total gear change only is complete conversion of all swordfish and mixed effort to tuna effort.

NMFS Combination 1 is no fishing between 30N-44N all year, no fishing between 23N-44N or between 6N-16N in April and May, 20% of lost effort (=636 sets) allowed with observers Tuna-only south of 30N.

NMFS Combination 2 is no fishing between 30N-44N all year, no fishing between 23N-44N or between 6N-16N in April and May Tuna-only south of 30N

NMFS Combination 3 is no fishing north of 29N year around and no fishing in April and May, 12% of historical effort allowed with observers in closed time/areas (=514 sets).

NMFS Combination 4 is no fishing north of 29N year around and no fishing in April and May, no effort allowed in closures.

Total gear change only* is conversion of all shallow sets to deep sets

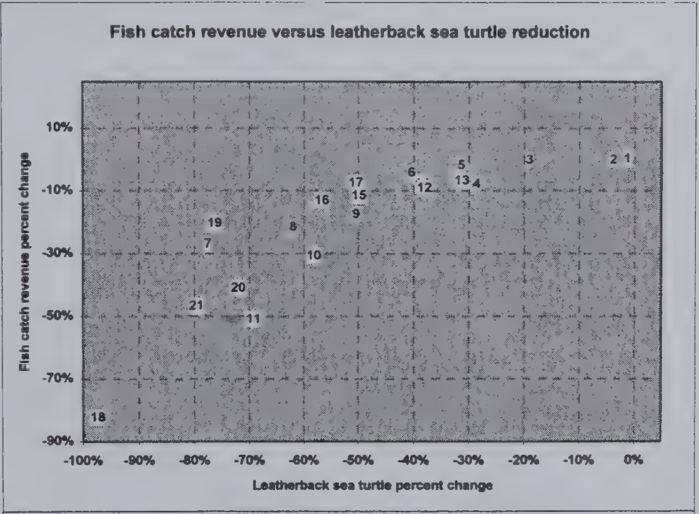
NMFS Combination 5 is no fishing north of 29N all year, no fishing from November thru July (9 month closure).

Total gear change only** is conversion of all shallow sets to deep sets and April/May seasonal closure

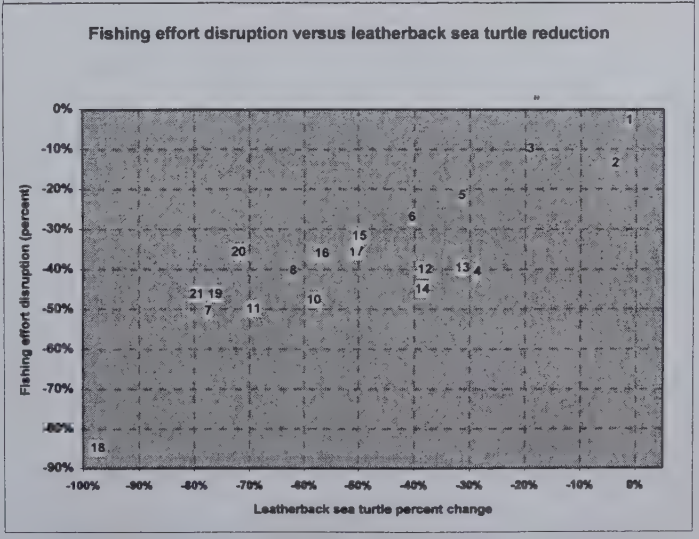
Total gear change only*[n.s = no switching] is complete elimination of all shallow sets

Total gear change only**[n.s. = no switching] is complete elimination of all shallow sets and April/May seasonal closure

	REV	LEA
HLA (with observers)	0%	-1%
HLA (without observers)	0%	-4%
Hampton	0%	-19%
Hampton*	-8%	-29%
NMFS (with observers)	-2%	-31%
NMFS (without observers)	-4%	-40%
Plaintiff	-27%	-78%
Plaintiff*	-22%	-62%
Plaintiff**	-18%	-50%
Court Final (switching)	-31%	-68%
Court Final (no switching)	-51%	-69%
Total gear change only	-9%	-38%
NMFS Combination 1	-7%	-31%
NMFS Combination 2	-8%	-39%
NMFS Combination 3	-11%	-50%
NMFS Combination 4	-13%	-57%
Total gear change only*	-7%	-50%
NMFS Combination 5	-82%	-97%
Total gear change only**	-20%	-76%
Total gear change only*[n.s.]	-41%	-72%
Total gear change only**[n.s.]	-47%	-80%



	FED	LEA
HLA (with observers)	-3%	-1%
HLA (without observers)	-14%	-4%
Hampton	-10%	-19%
Hampton*	-41%	-29%
NMFS (with observers)	-22%	-31%
NMFS (without observers)	-27%	-40%
Plaintiff	-50%	-78%
Plaintiff*	-40%	-62%
Plaintiff**	-33%	-50%
Court Final (switching)	-48%	-68%
Court Final (no switching)	-50%	-69%
Total gear change only	-40%	-38%
NMFS Combination 1	-40%	-31%
NMFS Combination 2	-45%	-39%
NMFS Combination 3	-32%	-50%
NMFS Combination 4	-36%	-57%
Total gear change only*	-36%	-50%
NMFS Combination 5	-85%	-97%
Total gear change only**	-46%	-76%
Total gear change only*[n.s.]	-36%	-72%
Total gear change only**[n.s.]	-46%	-80%



APPENDIX D

Recommendations from Dr. Larry B. Crowder on Time/Area Closure Analysis for Turtle Take Reductions.

Review and Analysis of

"Time/area closure analysis for turtle take reductions"

by Donald R. Kobayashi and Jeffery J. Polovina

Dr. Larry B. Crowder
Duke University Marine Laboratory
135 Duke Marine Lab Road
Beaufort, NC 28516-9721
lcrowder@duke.edu

Introduction

In her charge to the review panel, Penelope R. Dalton, Assistant Administrator for Fisheries at the National Marine Fisheries Service (NMFS) asked members of a review panel to evaluate a NMFS analysis leading toward "time and area closures that would provide *the greatest benefit to the sea turtles* as required by the Order of Injunction," issued by Judge David Ezra in November 1999. The Injunction itself requires that after the panel review of the analysis, "NMFS will make the appropriate time and area closures *based upon the greatest benefit to sea turtles and considering the costs to the Hawaii-based pelagic longline fishery*" (emphasis added). Therefore, my objective in this report is to first evaluate the NMFS analysis and second to make recommendations that meet the intent of the Injunction.

All four species of sea turtles taken in the Hawaii longline fishery are threatened or endangered under the US Endangered Species Act (Pacific Sea Turtle Recovery Team 1998). Loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*) and olive ridley sea turtle (*Lepidochelys olivacea*) are considered threatened (olive ridley and green sea turtle nesting populations in Mexico are endangered) and the leatherback *Dermochelys coriacea* is endangered throughout the Pacific Ocean (Pacific Sea Turtle Recovery Team 1998). Based on a very small observer program (<5% of sets observed), NMFS scientists estimate that an average 370 loggerheads are taken per year (Kleiber 1998), primarily from the Japanese and Australian nesting populations (Dutton et al. *in press*). These populations have declined by about 50% over the last 5-20 years at all the monitored nesting beaches in Japan (Naoki Kamezaki, as cited in Bolten et al. 1996) and by 50-80% in Australia over the last 10-15 years (Limpus and Reimer 1994). NMFS estimates that 110 olive ridleys are taken per year in Hawaii longline sets. Nearly half derive from western Pacific rookeries and half originate in Mexico and Costa Rica (Dutton et al. *in press*). Some global nesting populations have declined (the Mexico nesting population is now considered endangered) while others are stable or possibly increasing (Pacific Sea Turtle Recovery Team 1998). Only an average of 32 green turtles are thought to be taken annually in the fishery, but 3 of 4 sampled for genetic analysis derive from the Mexico nesting population, which is considered endangered

(Pacific Sea Turtle Recovery Team 1998).

The most serious concern is for leatherback sea turtles, which are the second most commonly taken turtle in the longline fishery (averaging 166 per year, increasing steadily from 154 [1994] to174 [1998] despite apparent population declines throughout the Pacific). Leatherbacks in the Pacific Ocean are critically endangered—every nesting population in the Pacific basin has undergone catastrophic declines in abundance. Most of the individuals taken in Hawaiian longlines come from nesting populations in the western Pacific, but about 20% may originate on eastern Pacific beaches (Dutton et al. *in press*). Leatherback populations in Irian Jaya, Indonesia have declined 4.6 fold over the last 15 years, to less than 3,000 nests (about 600 nesting females) in 1999 (Dutton et al. 2000). In Terengganu, Malaysia, leatherback nesting has declined to less than 1% of levels recorded in 1956—only 37 nests were laid in 1995 and 10 (2 nesting females) in 1997 (Chan and Liew 1996, Eckert pers. comm.). The Terengganu population is projected to be locally extinct in just 3 years (i.e., by 2003, Chan and Liew 1996). Leatherback populations in the eastern Pacific are equally critical. Over the last 20 years, nesting populations in Mexico and Costa Rica have declined dramatically—these populations have declined at rates exceeding 20% per year over the last 5 years (Sarti et al. ms., Spotila et al. 1996). In Mexico, nesters have dropped from 985 to about 250 per year over the period 1995-99. Nesting populations in Costa Rica declined from 800-1000 turtles in the early to mid-1990s to an average of 166 nesters over the last two years. A recent population model for the Costa Rican population predicts local extinction within 10 years—the number of nesting females is expected to drop below 50 in just four years (i.e., by 2004, Reina et al., Nature, *in press*).

Based on numbers of nesting females from the mid-1990s, Wetherall (1997) estimated 4,870 nesting leatherbacks per year throughout the Pacific. By 1998-99, this number has fallen to about 1028. This is approximately a 20% per year decline over the whole Pacific Ocean. Using Wetherall's (1997) multiplier, this suggests that the current abundance of juvenile and adult leatherbacks in the entire Pacific Ocean of about 17,500. Wetherall (1997) calculated a Potential Biological Removal (PBR) modeled after the approach to set allowable takes for marine mammals. If we use Wetherall's (1997) formula based on current data, PBR = 17,500 x (0.024/2) x 0.1 = 21 large juvenile and adult leatherbacks. Recent estimates of leatherback kills in the Hawaii longline fishery average 11 turtles per year (95% CI 0-23, Kleiber 1998), so the leatherback mortalities in the Hawaii longline fishery average about half of the basin-wide PBR. This does not consider takes in other Pacific fisheries not regulated by the US. It also assumes that current estimates of the number of leatherbacks taken and of mortality per take are correct.

Due to the basin-wide collapse of nesting populations, leatherback sea turtles in the Pacific are clearly on the brink of extinction (Chan and Liew 1996, Spotila et al. 1996, Reina et al. 2000). All anthropogenic sources of mortality must be reduced immediately to near zero, particularly for large juveniles and adults. While the Hawaii longline fishery may not take a large number of leatherbacks relative to other international fisheries in the Pacific, these populations can ill afford any incidental mortality. Action was taken over ten years ago

21

to minimize egg mortality in the major nesting areas and drift gill nets were banned in 1993. But the nesting populations show no sign of recovery. On the contrary, populations throughout the Pacific Basin have continued to plummet downward at rates unprecedented in sea turtles. Any decisions regarding tradeoffs between protecting turtles and fisheries should clearly employ the precautionary approach. Clearly, reductions in all other fisheries-related mortality also must be pursued promptly. But only when the U.S. has demonstrated our resolve to reduce sea turtle bycatch can we approach the international fishery and encourage them to do the same.

The NMFS Analysis of Time/Area Closures

Kobayashi and Polovina conducted their analysis in two phases—first, they developed statistical models of the seasonal and spatial distribution of takes, and second, they used these models to estimate the effects of various time/area closures on sea turtle take and impacts on fisheries. The statistical models employed general additive model (GAM) techniques to estimate sea turtle take per longline set based on data from the observer program (over 2800 sets from 1994-98). The GAM model estimates turtle takes per set based on a series of potentially relevant variables including: latitude, longitude, trip-type, month, year, moon phase and sea surface temperature.

While GAM analysis seems a rational way to model these data, I should first comment on the limitations of the database. The observer program is based on a stratified, random sampling design that tends to emphasize sampling larger vessels in the northern part of the fished area. Furthermore, because of the limited size of the observer program (less that 5% of trips sampled), one could question the validity of the data on a number of grounds. First, one would expect that takes and kills might well be higher on unobserved trips, so observed numbers may well be biased low. Second, despite sampling an apparently large 2800 longline sets, these sets were observed during only about 50 observed trips per year, so the number of independent estimates is rather small. On these 50 trips, only about 40 takes were observed, so all together for all species of sea turtles, the spatio-temporal analysis is based on less than 200 observed takes over five years. In Kobayashi and Polovina's GAM analysis, they are trying to establish a spatio-temporal distribution model for leatherbacks **based on only 37 sightings over 5 years!** As a result, one should treat the predictions of the GAM analysis very conservatively.

The final GAM model for leatherbacks includes smoothed non-linear terms for latitude and moon phase, a linear term for longitude and a catagorical variable for month. The loggerhead (for which there were more observations) supported a somewhat more elaborate model. Observed takes of olive ridleys and greens produced models of only very limited utility. Categorical and Regression Tree (CART) analysis conducted by Kleiber (1998) failed to find any environmental, temporal or spatial correlates of observed leatherback catch. The caution then is that the data supporting the spatio-temporal model at the foundation of this entire analysis is extremely limited and fishery-dependent. Aside from loggerheads (Polovina et al. 2000), we understand little about the seasonal distribution dynamics of north Pacific sea turtles. Right now, the GAM analysis provides the only view of locations where turtle takes per unit effort may be high on a seasonal basis (Appendix 1). Times and places where the longline fishery experiences high takes per set must be avoided to reduce bycatch of endangered sea turtles. But we must be cautious over-interpreting the GAM analysis simply because it is based on so little data. The GAM analysis also suggests seasonal periods when takes might be expected to be high over a broad geographic area.

In another paper, Polovina et al (2000) caution "defining juvenile loggerhead distribution based on incidental catches in fishing gear may be biased sampling of their habitat because the fishing gear is not targeting turtles." (Polovina et al. 2000). I agree strongly—it will require fishery independent data on leatherback distributions and movements to objectively determine effective time/area closures to protect these turtles. Similar data on the distribution of fishers could be derived from the logbook data and from satellite-based monitoring of at-sea positions. For now, the observer data is all we have to go on in our efforts to suggest time/area closures. Obviously any program to establish the seasonal spatial distribution of leatherbacks (especially independent of the fishery) would be highly desirable.

Once the GAM models were complete, Kobayashi and Polovina estimated the spatial and temporal distribution of turtle take per set for the unobserved sets in the fishery (i.e., based on the logbook data). Because the unobserved sets constitute over 95% of the effort, this is a bold extrapolation. They then performed a very large number of management simulations to examine a variety of possible time/area closures. For each simulation, they estimated the effects on turtle take and on fisheries catch, using a variety of measures. One critical assumption of the approach is that lost fishing effort is redistributed randomly over the fished area and that some (but not all) of lost time spent fishing due to time closures could be made up. These are reasonable beginning assumptions, but ultimately a more comprehensive analysis of fisher behavior and economic costs will be necessary to tune the time/area closures.

Kobayashi and Polovina then searched the output binned by % reduction in leatherback takes (as leatherbacks are the most highly endangered of the bycatch) and established which runs sort to the "efficient frontier" which minimizes fishery effort disruption for an estimated level of bycatch reduction (Appendix 2, their Figure 10). Obviously fishery disruption is a poor measure of costs to the fishery, but may serve as useful proxy for costs to screen management alternatives until more comprehensive analyses can be completed. Kobayashi and Polovina used bootstrapping techniques to estimate the 95% confidence interval around mean leatherback take reduction for any particular management scenario (Appendix 2, their Figure 11). For any level of take reduction for leatherbacks, one could examine the "revenue frontier" (Appendix 2, their Figure 12) that estimates revenue loss to the fishery for each management scenario. In general, results of these model simulations suggest that combinations of a seasonal closure fishery wide and a permanent spatial closure will be necessary to protect a significant number of leatherbacks (Their Appendix 3, selected pages attached here as Appendix 3).

41

Criteria for Selecting a Time/Area Closure for the Hawaii Longline Fishery

Based on the text of the injunction, we must first consider the greatest benefit to the urtles and then the costs to the fishery. Given that the number of nesting Pacific leatherback sea turtles are at all time lows, that recent rates of decline are unprecedented, and that at least wo major nesting populations have been predicted to disappear within the decade—NMFS must act decisively to reduce sea turtle mortality in all life stages. Only adult leatherbacks have a higher per capita reproductive value to the population than the large juveniles that are being taken as bycatch in the Hawaii longline fishery. What this means is that individual uveniles and subadults taken in the longline fishery are much more likely to contribute to population recovery than a individual leatherback eggs protected from harvest. This result has been demonstrated for the loggerhead population models (Crouse et al. 1987, Crowder t al. 1994, Heppell 1998) and likely also applies to other sea turtles including leatherbacks. Given the poor return rates of first-time nesters to lay nests in later years, the potential for opulation recovery may be strongly dependent upon enhanced juvenile survival (Spotila et l. 1996). Time/area closures that protect other sea turtles are desirable given the ndangered status of some affected populations and recent declines in western Pacific oggerheads, but our primary focus must remain on leatherbacks. With just over 1000 esting females per year, Pacific leatherbacks rank as the most endangered sea turtle globally. Kemp's ridley sea turtles formerly held that designation, but they now have over 2000 emales nesting per year and the population has been increasing steadily since the mid-1980s (TEWG 1998).

In terms of costs to the fishery, we must choose options that minimize impacts on evenue at any particular level of turtle take reduction. For ease of management and to educe losses of fishery effort, it seems reasonable that spatial closures might be preferable time closures—but only if sufficient reductions in turtle takes can be achieved. In ddition, closures over short time periods can simply delay takes of turtles until after the shery re-opens. This was the case with the initial seasonal TED requirements in the outheast US trawl fisheries—ultimately managers had to extend TED requirements to all aters, year around (TEWG 1998).

f course, the most effective way to reduce turtle takes is to close the Hawaii-based longline shery, but this extreme is beyond the scope suggested by the Injunction. However, if we amine the revenue frontier for time/area closures (Appendix 2, their Figure 12), we see that sses to the fishery increase rapidly at leatherback take reductions exceeding 80%. In fact, is analysis suggests management options that can reduce leatherback takes by 70-80% thout reducing revenues more than about 25% (See Appendix 3, Leatherback turtle take duction bin #16). For example, a policy that closes waters north of 29N year around and e remaining waters for 4 months beginning in April can reduce leatherback takes by nearly %; this scenario also has the advantage of reducing loggerhead takes by 63%. This option pears highly cost effective, contributing to significant take reductions of leatherback, ggerhead, olive ridley and green sea turtles (See Appendix 3, Leatherback turtle take duction bin #16). Some other options within bin #16 provide similar advantages, but all require a four-month closure (April-July) along with a permanent spatial closure. Another advantage of this choice is that a 75% take reduction should be detectable even with a limited observer program. Any smaller target for take reduction will be difficult to detect, at least with the current observer coverage. **Among the options reviewed, I strongly recommend a policy that closes waters north of 29N year around and the remaining waters for 4 months beginning in April.**

The next plateau in the "revenue frontier" is in the zone where leatherback take reductions would be only 50-55% and revenue losses would be limited to about 10%. In my judgment, this is inadequate given the near-term potential for extinction of Pacific leatherback and that a PBR calculated using the formula in Wetherall (1997) suggests the Hawaii-based longline fishery could be killing about half of an allowable PBR for the entire Pacific basin. Even at 50%, leatherback take reduction would require a 2-3 month closure of the entire fishery and a latitudinal (or box) closure (See Appendix 3, bin 12). Choosing options in this range provides a reduction in leatherback takes of about half, but only cost the fishery about 10%. Effectively, you save 90% of the fishery revenue, but only half the leatherbacks. The option outlined in the previous paragraph saves about 75% of the revenues and 75% of the leatherbacks. This seems more in line with the balance of protecting turtles and the fishery outlined in the Injunction. This 50% reduction option and others providing even less protection are totally unacceptable given the critically endangered status of Pacific leatherback sea turtles.

Another issue favoring the 75% take reduction over the 50% take reduction is the uncertainty in the actual take reduction we can expect to achieve given each of these targets. Based on the bootstrap analyses (Appendix 2, their Figure 11). A take reduction target of 50% could in fact be as low as 18% (or as high as 75%), while a take reduction target of 75% is unlikely to achieve less than a 55% reduction and could achieve a 95% reduction. In short, there is less uncertainty around the outcome in leatherback takes around the 75% target than around the lower target (Appendix 2, their Figure 11). Note also that the uncertainty in take reduction under these analyses is much higher than the uncertainty in lost revenue.

Additional Analyses to Support NMFS Decisionmaking

Based on the Injunction issued by Judge Ezra, NMFS had only a short period of time to address alternative time/area closures and their implications for "appropriate time and area closures based upon the greatest benefit to sea turtles and considering the costs to the Hawaii-based pelagic longline fishery." Although additional analyses of the economic implications of particular time/area closure scenarios need to be done to tighten estimates of predicted impacts on the fishery, little can be done now to improve predictions of bycatch reduction for leatherback sea turtles. Given the critically endangered status of these populations and the acknowledged uncertainty in the predicted effects, NMFS must take a precautionary approach. The 75% solution I have proposed provides some parity—it protects 75% of the fishery revenues and 75% percent of the leatherbacks. It has the added benefit of protecting all the other threatened sea turtles as well. Leatherback take reductions beyond the 75% solution could have catastrophic economic effects on the fishery, but anything less will lead to catastrophic effects for Pacific leatherbacks.

Implementation

In order to evaluate the impact any time/area closure NMFS might implement **it will necessary to increase monitoring of the fishery substantially.** We understand all the boats in the fishery have satellite transponders that record their position and movements. Research access to these data would provide invaluable insights into the behavioral responses of fishermen to the closure. It would help immensely to go beyond the logbooks to examine where they are traveling and setting their gear relative to the closed area and to the distribution of leatherbacks and other sea turtles. In addition, NMFS can only improve their estimates of the seasonal/spatial distribution of sea turtles by 1) **significantly** enhancing the temporal and spatial coverage of the observer program and 2) conducting fishery independent research on the seasonal movement dynamics of leatherbacks (similar to that done by Polovina et al. 2000 for loggerheads). If we are to reduce contact rates between fishers and protected species we need to better understand their behaviors over space and time. Ultimately one could envision a GIS analysis that examines fisheries blocks based on fishing effort, sea turtle distribution, and sea turtle take per unit effort to identify times and places where closures could most effectively protect sea turtles and minimize impacts on fisheries. One such analysis has been done for shrimpers and turtles in the Gulf of Mexico (McDaniel et al. 2000).

Based on enhanced understanding of the behavior of both fishers and turtles, one could tighten estimates of the effects of various management alternatives on fisheries economics and on turtle population dynamics. But this will require dynamic models that are currently out of reach. In the meantime, the only feasible approach seems to be time/area closures. And based on the status of Pacific leatherbacks these closures should take the precautionary approach, erring on the side of protecting turtles rather than simply minimizing fishery impacts.

References

Bolton, A.B., J.A. Wetherall, G.H. Balazs and S.G. Pooley. 1996. Status of marine turtles in the Pacific Ocean relevant to incidental take in the Hawaii-based pelagic longline fishery. NOAA/NMFS Technical Memorandum SWFSC-230.

Chan, E.H. and H.C. Liew. 1996. Decline of the leatherback population in Terengganu, Malaysia, 1956-95. Chelonian Conservation and Biology 2(2):196-203.

Crouse, D.T., L.B. Crowder and H. Caswell. 1987. A stage-based population model for loggerhead sea turtles and implications for conservation. Ecology 68:1412-1423.

Crowder, L.B., D.T. Crouse, S.S. Heppell and T.H. Martin. 1994. Predicting the impact of turtle excluder devices on loggerhead sea turtle populations. Ecol. Appl. 4:437-445.

Dutton, P.H., E. Bixby, R. LeRoux and G. Balazs. in press. Genetic stock origin of sea turtles caught in the Hawaii-based longline fishery. IN: Proceedings of the Nineteenth Annual Symposium on Sea Turtle Biology and Conservation, March 1-2, 1999. South Padre Island, Texas, USA. NOAA-NMFS Tech Memo.

Dutton, P.H., M.A. Suarez, J. Bakarbessy and S.A. Eckert 1999. Migrations and population genetics of the leatherback sea turtle (*Dermochelys coriacea*) from Irian Jaya, Indonesia. Research Project Completion Report.

Heppell, S.S. 1998. Application of life-history theory and population model analysis to turtle conservation. Copeia 1998(2):367-375.

Kleiber, P. 1998. Estimating annual takes and kills of sea turtles by the Hawaiian longline fishery, 1991-1997, from observer program and logbook data. National Marine Fisheries Service Administrative Report H-98-08.

Limpus, C. and D. Reimer. 1994. The loggerhead turtle, *Caretta caretta*, in Queensland: A population in decline. Pp. 39-59. IN: R. James (compiler). Proceedings of the Australian Marine Turtle Conservation Workshop. Sea World Nara Resort, Gold Coast, 14-17 November 1990. Australian Nature Conservation Agency, Australia, 208p.

McDaniel, C.J., L.B. Crowder and J.A. Priddy. 2000. Spatial dynamics of sea turtle abundance and shrimping intensity in the U.S. Gulf of Mexico. Conservation Ecology (in press).

Pacific Sea Turtle Recovery Team. 1998. Recovery Plans for Pacific Sea Turtle Populations.

Polovina, J.J., D.R. Kobaysahi, D.M. Parker, M.P. Seki, and G,H, Balazs. 2000. Turtles on the edge: Movement of loggerhead turtles (*Caretta caretta*) along oceanic fronts spanning longline fishing grounds in the central North Pacific. Fisheries oceanography 9:1-13.

Reina, R.D., J.R. Spotila, A.C. Steyermark, P. Plotkin and F.V. Paladiino. 2000. Imminent extinction of Pacific leatherbacks and implications for marine biodiversity. Nature (in press).

Sarti, L., A. Barragan and S. Eckert. ms. Estimation of the nesting population size of the leatherback turtle (*Dermochelys coriacea*) in the eastern Pacific during the 1998-99 nesting season. Final Report.

Spotila, J.R., A.E. Dunham, A.J. Leslie, A.C. Steyermark, P.T. Plotkin and F.V. Paladino.

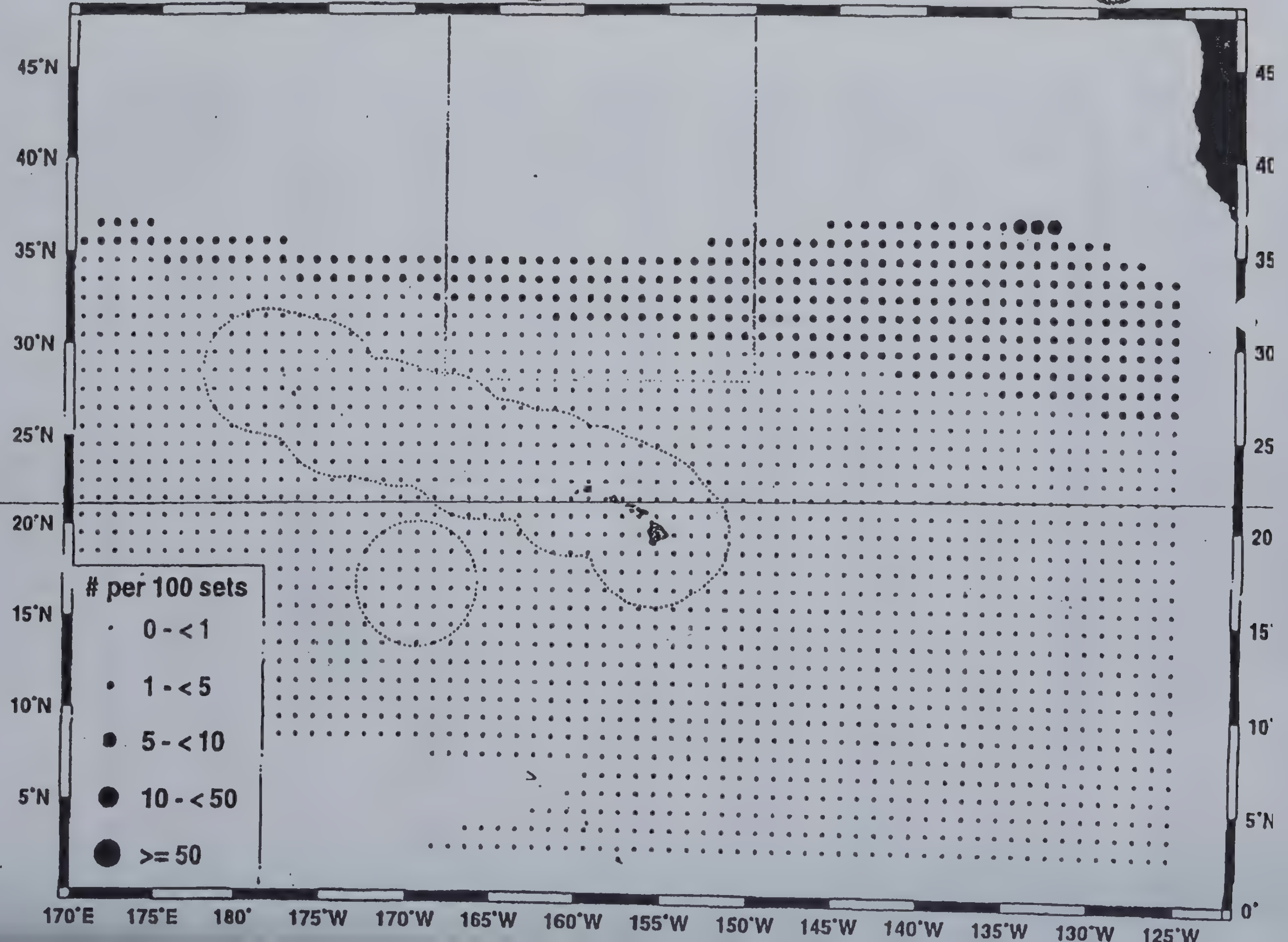
1996. Worldwide population decline of *Dermochelys coriacea:* Are leatherbacks going extinct? Chelonian Conservation and Biology 3(1):58-63.

Turtle Expert Working Group.1998. An assessment of the Kemp's ridley (*Lepidochelys kempii*) and loggerhead (*Caretta caretta*) sea turtle populations in the western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-409. 96pp.

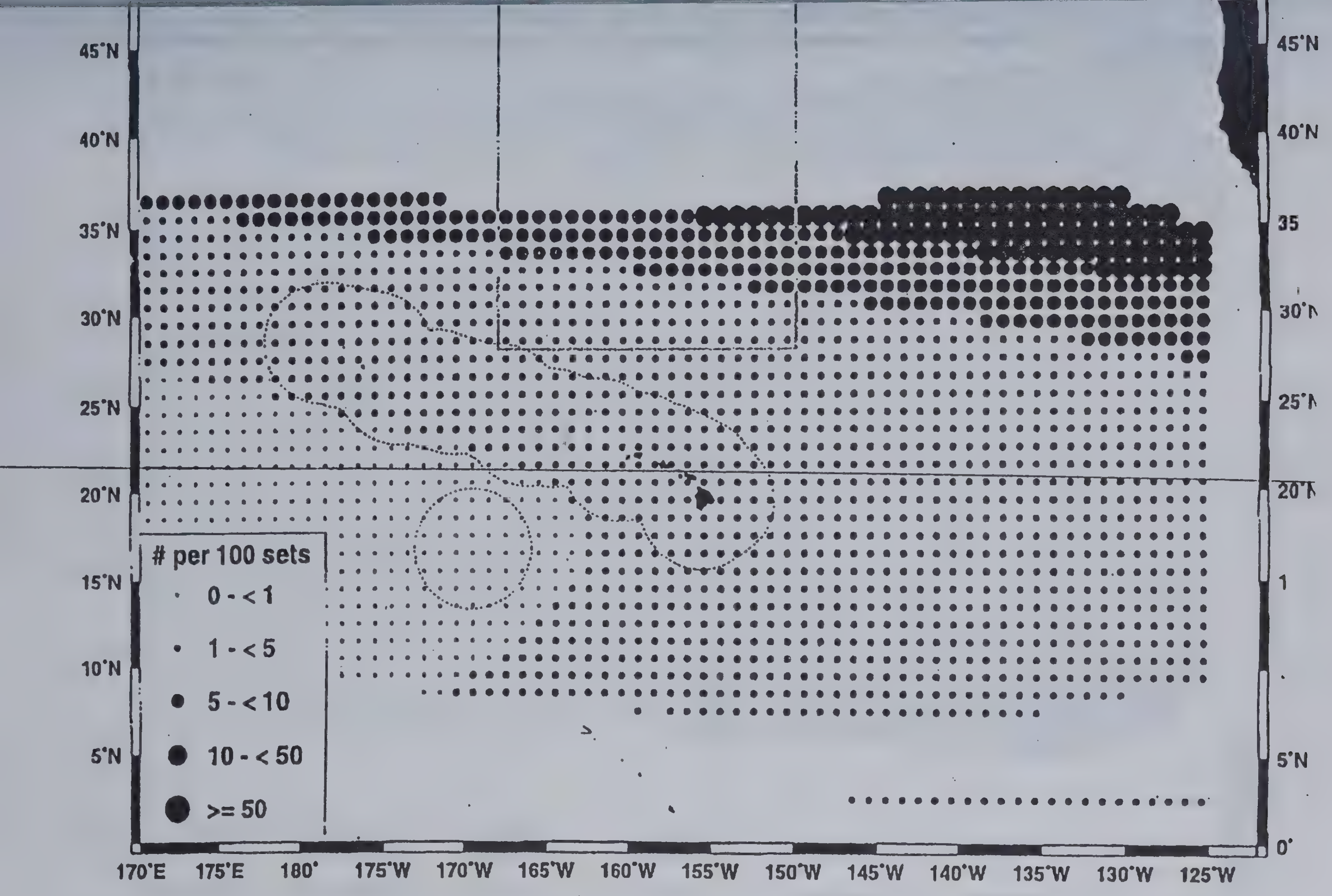
Wetherall, J. 1997. Mortality of sea turtles in the Hawaii longline fishery: A preliminary assessment of population impacts. NMFS Administrative Report H-91-07.

Appendices Attached

Month 1 leatherback turtle ab ance grid, 0.5 moon phase, overall sst, 1998 ect

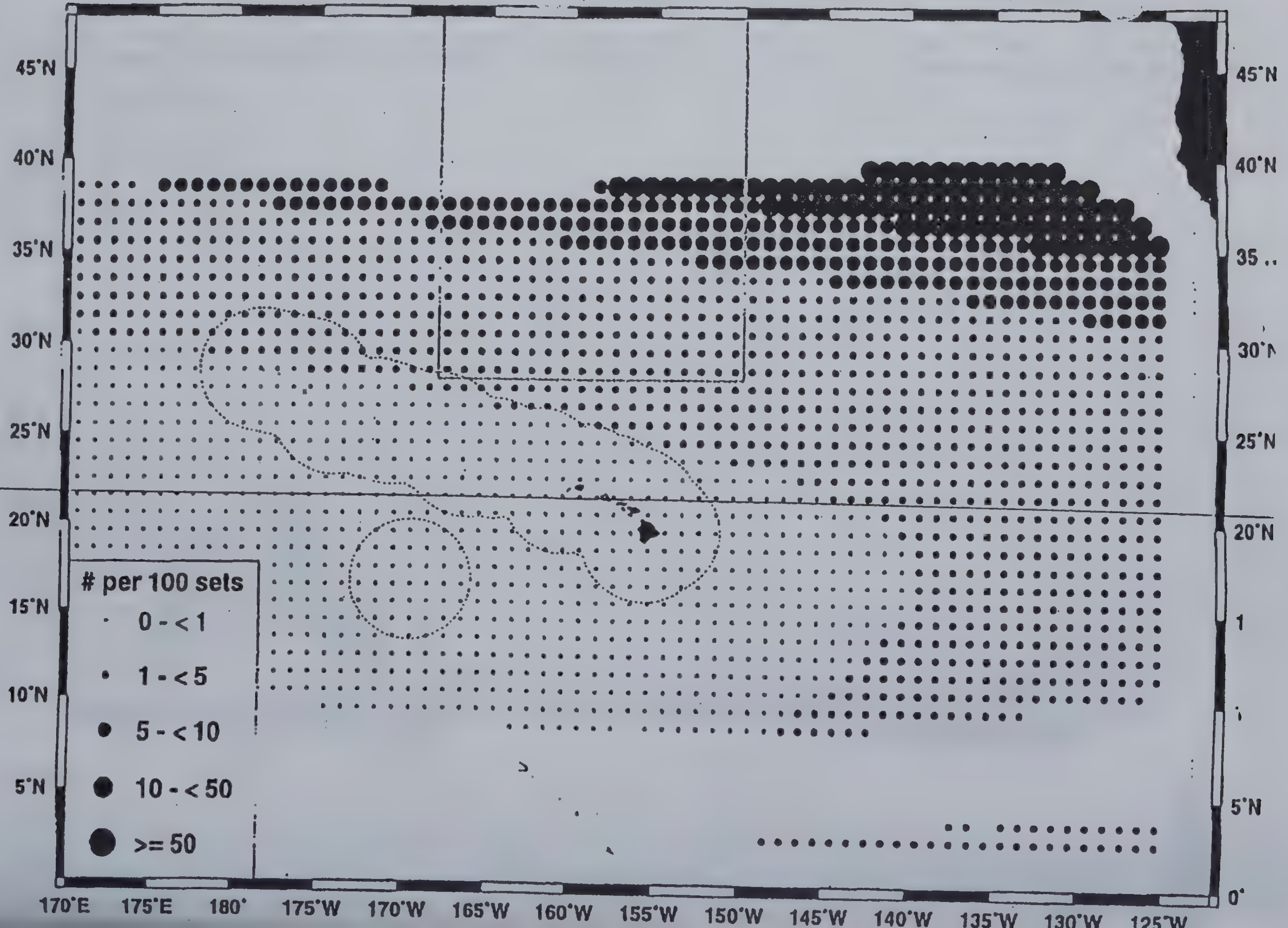


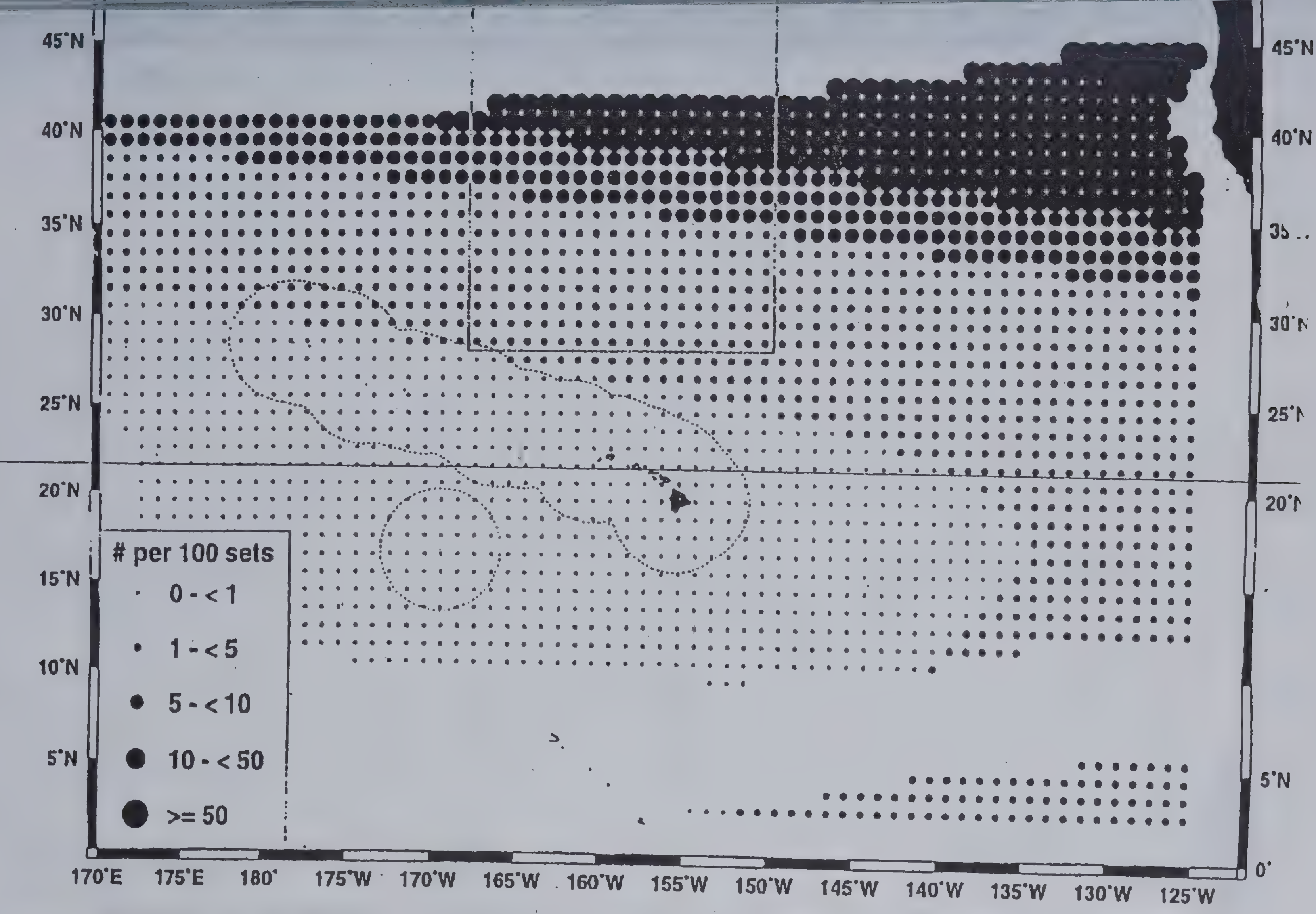
45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
45
40
35
30
25
20
15
10
5°N
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
135°W
130°W
125°W
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50


45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
35
30°N
25°N
20°N
1
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
135°W
130°W
125°W
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50

GMT Dec 8 07:45:03 1999 Monthly turtle predicted abundance surface at 1d resolution, overall set effect, 0.5 moon, 1998 abundance

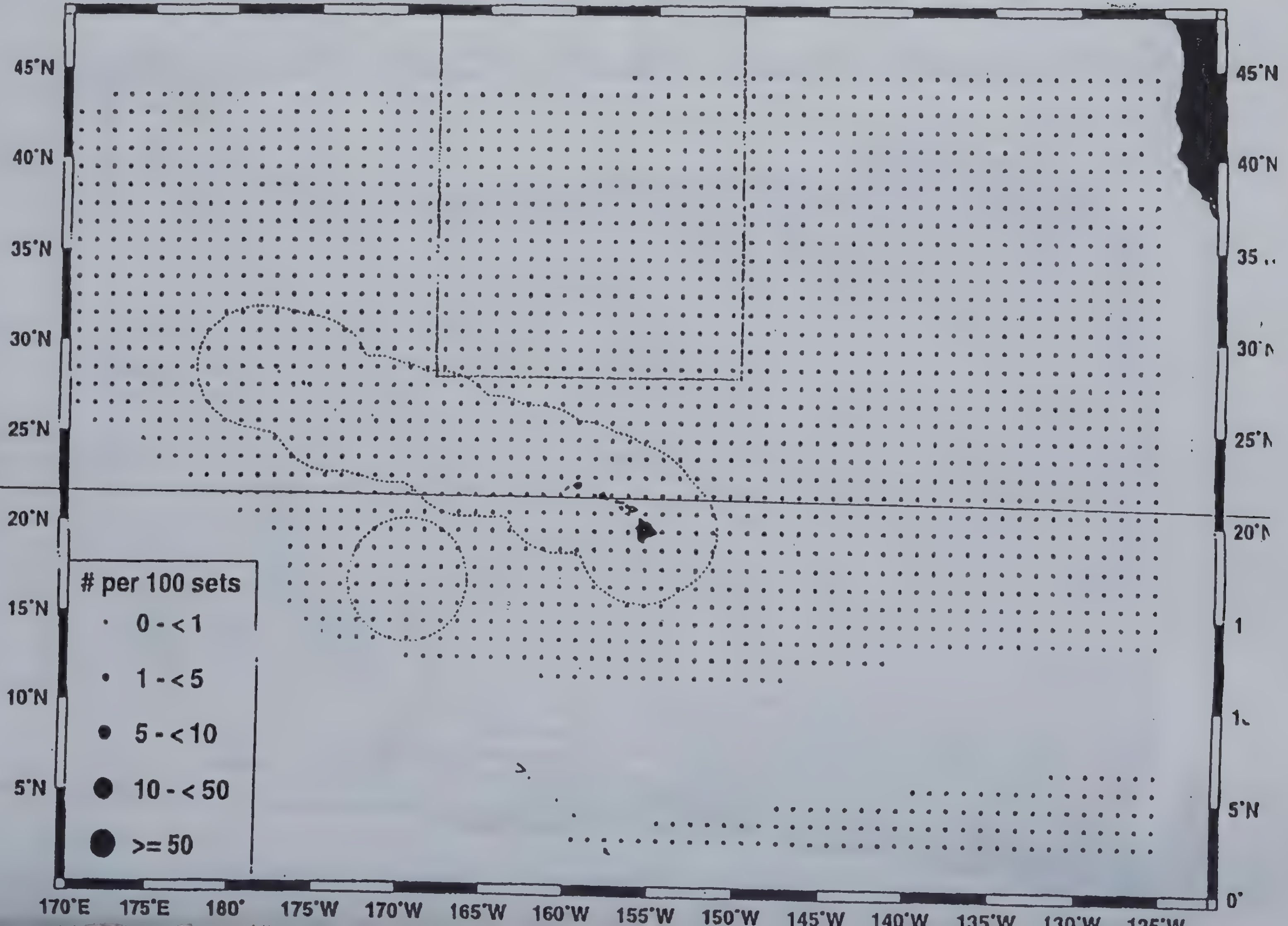
Month 6 leatherback turtle abu ice grid, 0.5 moon phase, overall sst, 1998 e

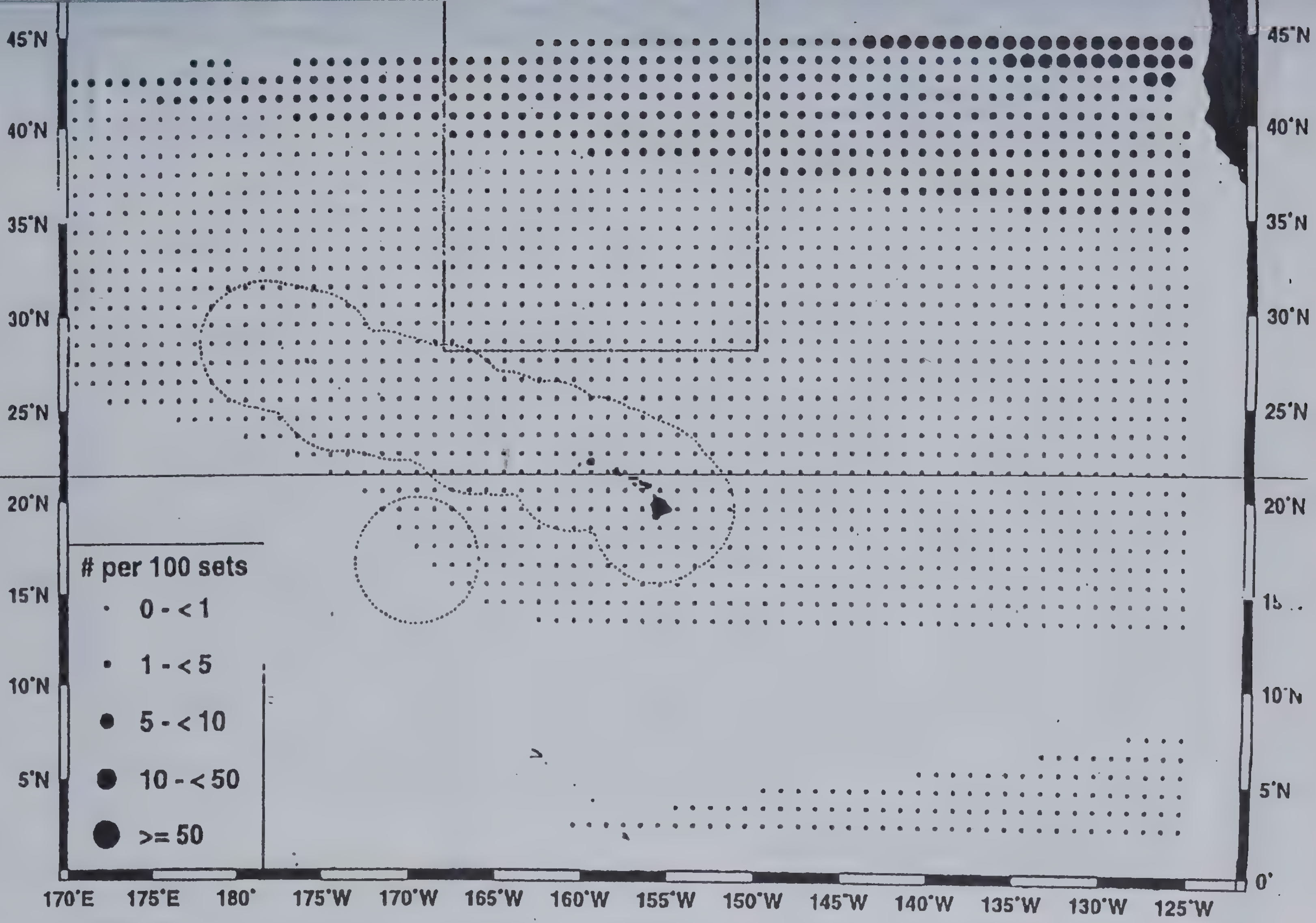

45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
45°N
40°N
35
30°
25°N
20°N
1
5°N
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
135°W
130°W
125°W
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50


45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
135°W
130°W
125°W
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50

GMT Dec 8 07:45:16 1999 Monthly turtle predicted abundance surface at 1d resolution, overall set effect, 0.5 moon, 1998 abundance

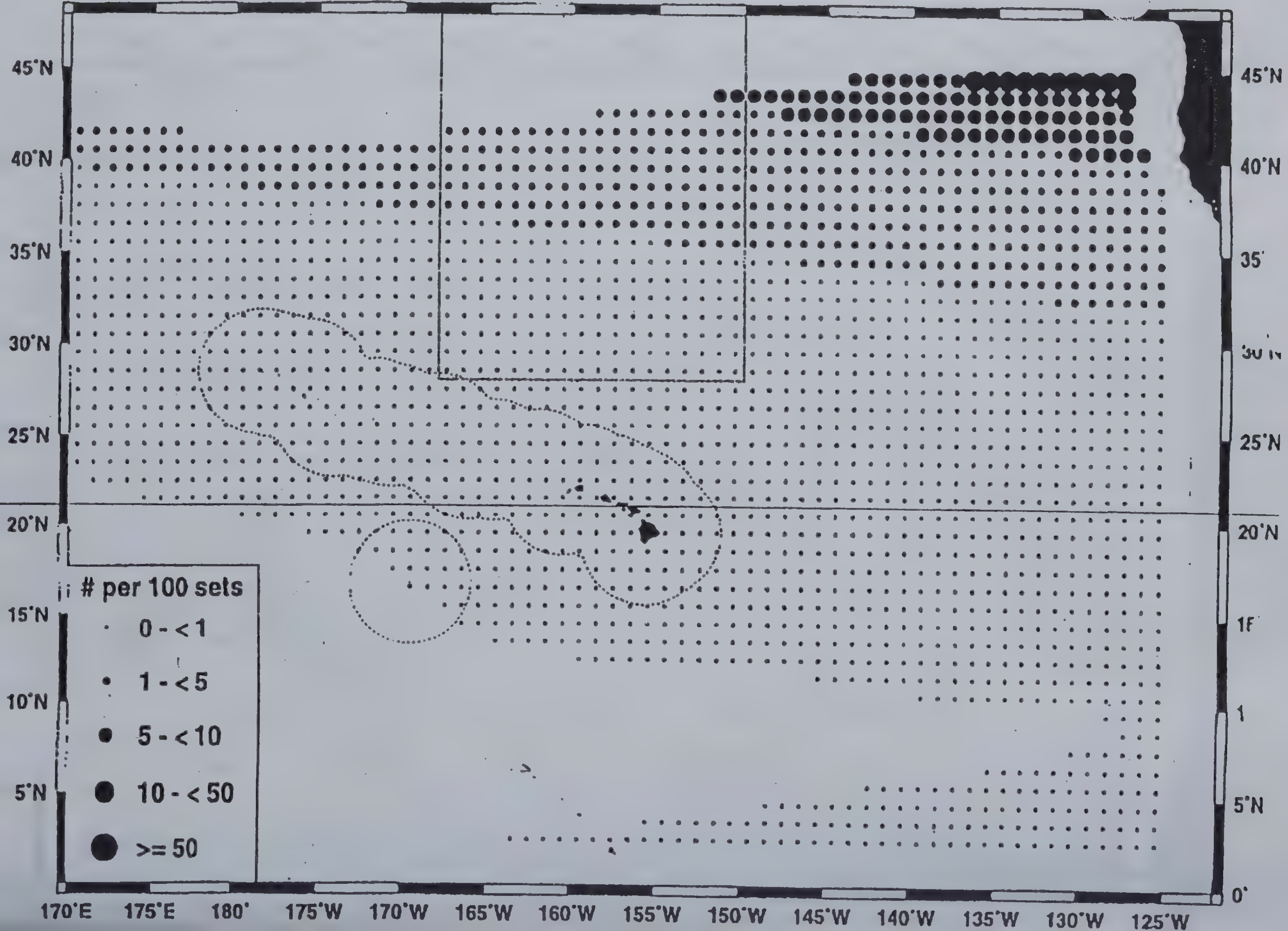
Month 8 leatherback turtle abu ice grid, 0.5 moon phase, overall sst, 1998 e


45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
135°W
130°W
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50

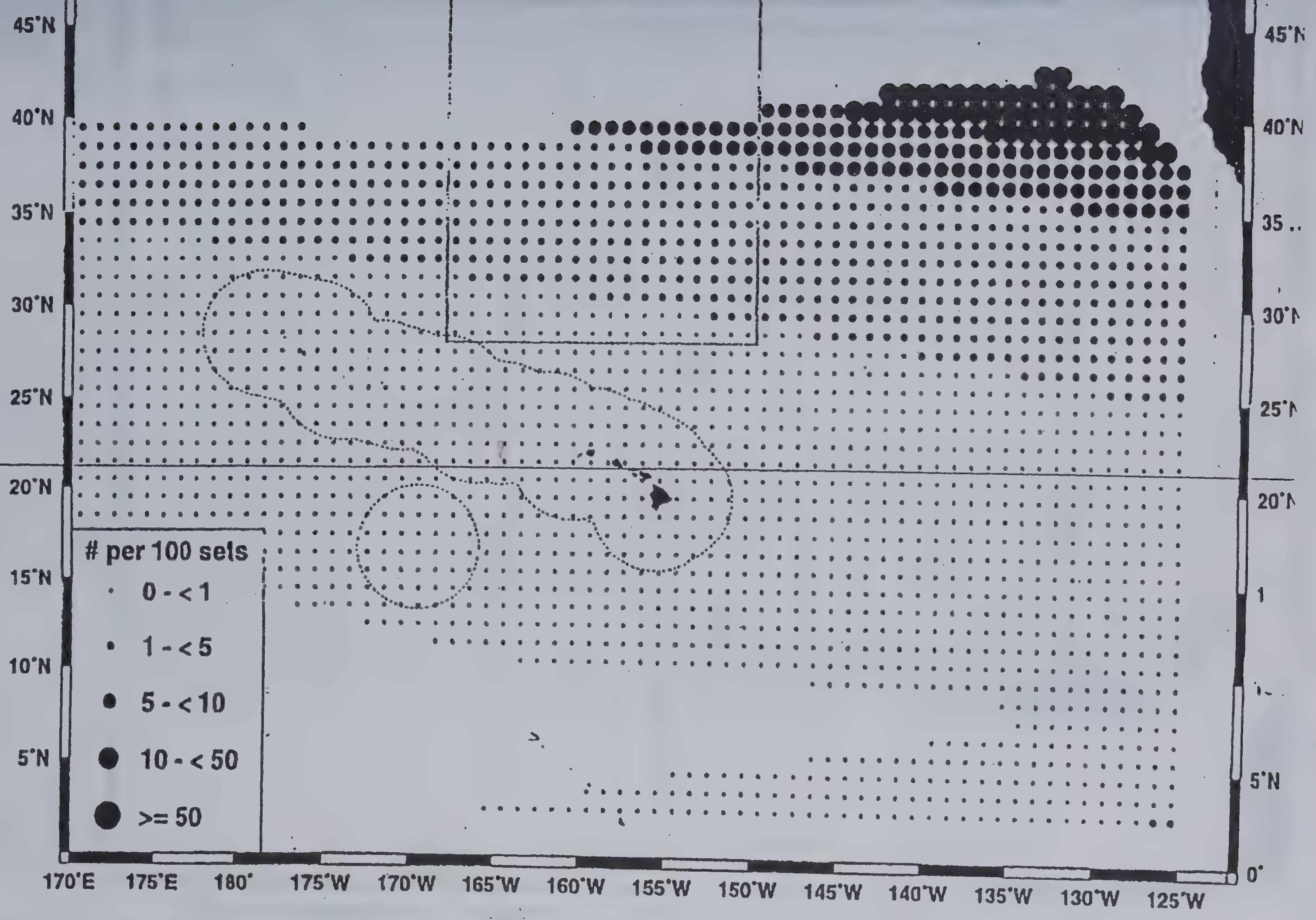

45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
135°W
130°W
125°W
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50

GMT Dec 8 07:45:29 1999. Monthly turtle predicted abundance surface at 1d resolution, overall set effect, 0.5 moon, 1998 abundance

Month 10 leatherback turtle abu ce grid, 0.5 moon phase, overall sst, 1998

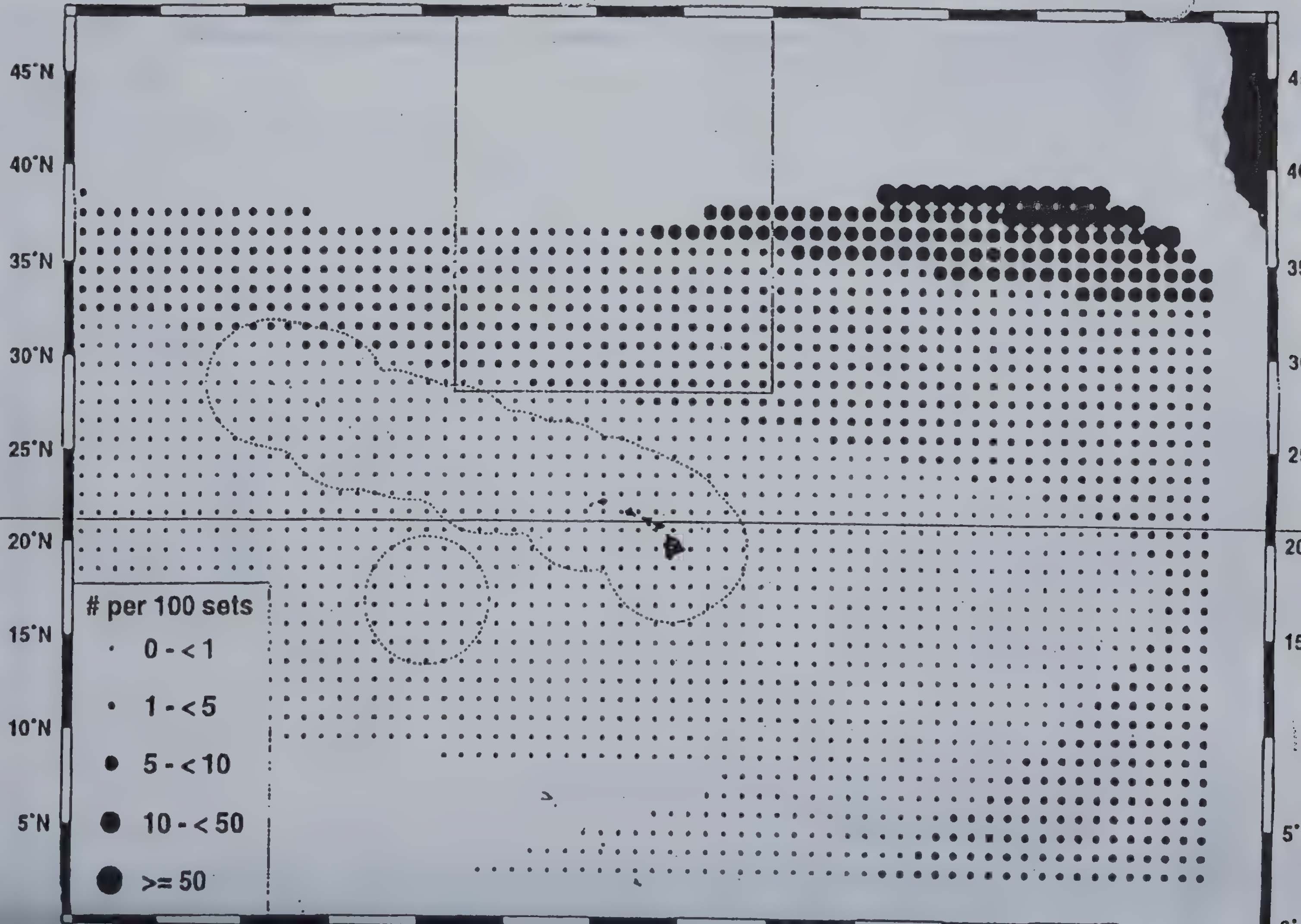


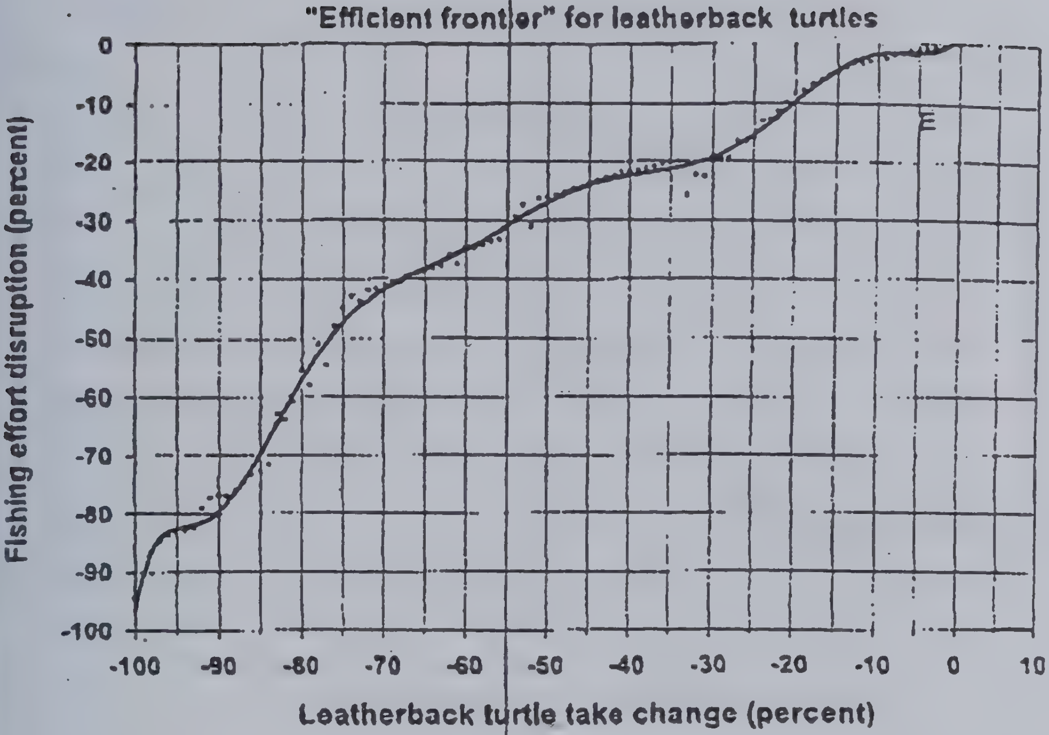
45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
135°W
130°W
125°W
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50


45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
135°W
130°W
125°W
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50

GMT Dec 8 07:45:42 1999 Monthly turtle predicted abundance surface at 1d resolution, overall set effect, 0.5 moon, 1998 abundance

Month 12 leatherback turtle abu ıce grid, 0.5 moon phase, overall sst, 1998 ‹ t


45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
# per 100 sets
0 - < 1
1 - < 5
5 - < 10
10 - < 50
>= 50


"Efficient frontier" for leatherback turtles
Fishing effort disruption (percent)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
Leatherback turtle take change (percent)

ure 10

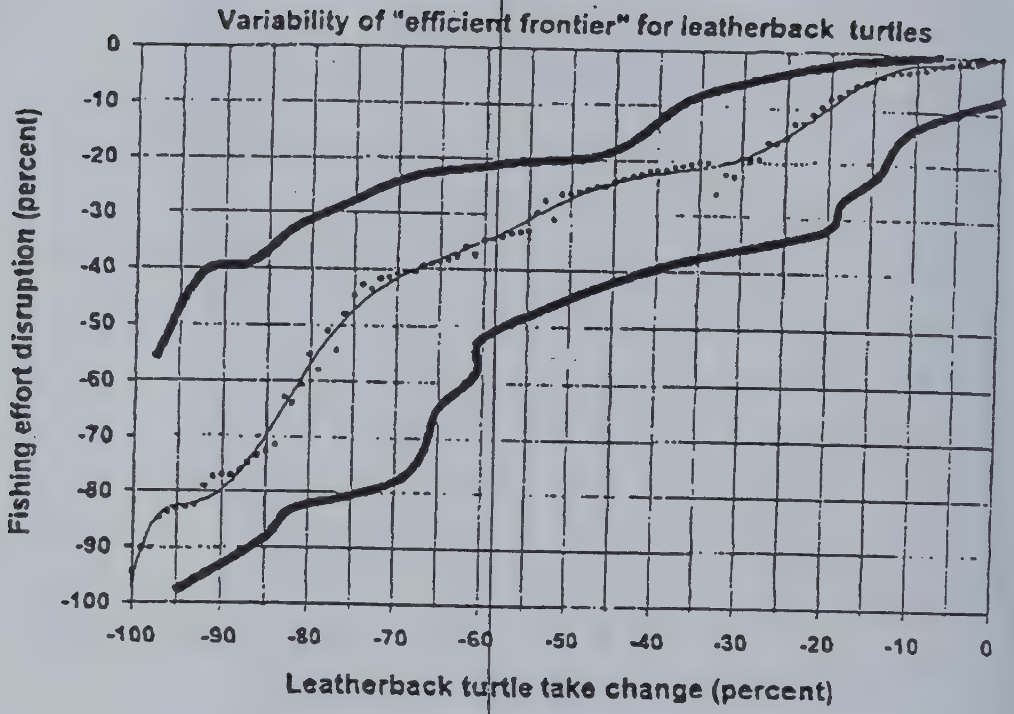
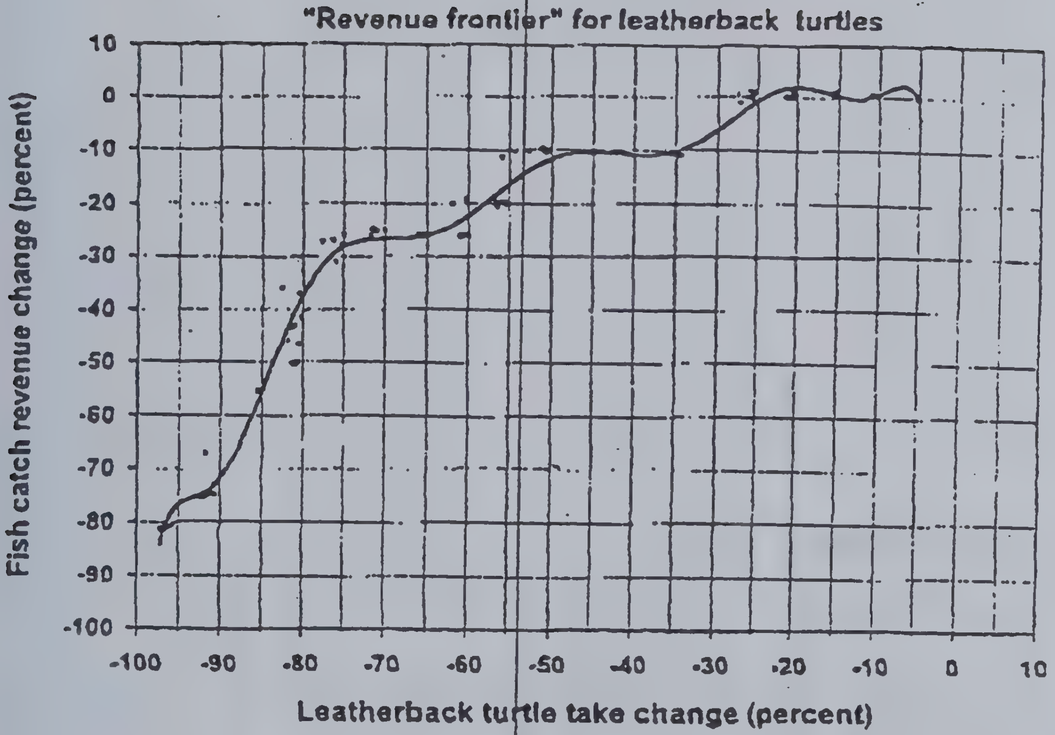

Variability of "efficient frontier" for leatherback turtles
Fishing effort disruption (percent)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
Leatherback turtle take change (percent)

Figure 11


"Revenue frontier" for leatherback turtles
Fish catch revenue change (percent)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
Leatherback turtle take change (percent)

igure 12

```
Separated season latitude        6      2      28  -64.58%  -42.73%  -46.22%  -51.29%  -82.56%  -12.83%  -53.13%  -82.20%  -20.52%  -55.50%  -40.12%  -38.12%  -27.36%  -25.37%
Leatherback turtle take reduction bin # 16 : -75% to -80%:
10 best of 3965 scenarios at this take level with minimum fishing effort disruption
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action      #Mn     Nr Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season latitude        4      4      29  -51.76%  -26.35%  -27.11%  -53.45%  -77.58%  -18.39%  -31.12%  -43.43%   -8.39%  -35.78%  -16.95%  -29.53%   -5.64%  -17.55%
Separated season latitude        4      4      32  -48.23%  -26.35%  -26.73%  -54.16%  -76.53%  -22.03%  -31.28%  -55.72%   -7.36%  -33.73%  -16.72%  -25.93%   -6.16%  -16.27%
Separated season latitude        4      4      31  -44.71%  -26.35%  -25.85%  -48.54%  -75.32%  -21.30%  -33.31%  -48.53%   -7.65%  -32.56%  -14.05%  -26.37%   -5.24%  -13.33%
Separated season latitude        5      1      32  -32.49%  -32.21%  -32.94%  -55.95%  -75.38%  -27.93%  -38.77%  -58.13%  -13.67%  -45.07%  -27.18%  -26.96%  -12.72%  -24.74%
Separated season box             4      4  166026  -32.33%  -26.35%  -25.92%  -43.85%  -75.06%  -22.32%    3.52%  -44.14%  -13.18%  -36.27%  -21.02%  -20.71%  -21.75%  -20.55%
Separated season box             4      4  172027  -32.61%  -26.35%  -28.08%  -53.15%  -75.26%  -19.22%   16.33%  -39.51%   -9.86%  -36.56%  -19.16%  -22.31%  -17.21%  -17.94%
Separated season box             4      4  171027  -32.27%  -26.35%  -27.62%  -47.95%  -75.16%  -19.55%   13.15%  -36.83%  -13.19%  -36.16%  -19.53%  -22.16%  -18.24%  -19.21%
Separated season box             4      4  172028  -31.66%  -26.35%  -25.72%  -49.25%  -75.23%  -19.76%    2.64%  -39.82%   -8.66%  -35.36%  -18.62%  -19.02%  -13.30%  -13.15%
Separated season box             4      4  172028  -31.47%  -26.35%  -27.83%  -43.60%  -75.92%  -22.53%    6.39%  -36.93%   -8.50%  -35.22%  -18.92%  -21.66%  -14.33%  -18.22%
Separated season box             4      4  172025  -69.81%  -26.33%  -25.79%  -41.52%  -75.03%  -22.55%  -11.51%  -32.81%   -8.20%  -35.82%  -18.53%  -17.62%  -16.41%  -18.65%

Leatherback turtle take reduction bin # 15 : -70% to -75%:
10 best of 4163 scenarios at this take level with minimum fishing effort disruption
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action      #Mn     Nr Lon/Lat    FED      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season latitude        4      4      33  -41.75%  -26.35%  -25.96%  -33.92%  -72.73%  -23.06%  -35.42%  -42.35%   -9.68%  -35.20%  -23.35%  -14.33%   -9.75%  -13.87%
Separated season box             4      4  172032  -41.96%  -26.35%  -26.72%  -21.26%  -72.55%  -25.74%  -25.97%  -38.32%   -9.73%  -38.26%  -23.36%  -12.25%  -15.80%  -20.24%
Separated season box             4      4  171032  -41.87%  -26.95%  -26.76%  -21.26%  -72.53%  -25.08%  -26.35%  -37.32%   -9.32%  -35.33%  -23.46%  -12.62%  -15.06%  -20.31%
Separated season box             4      4  170032  -41.79%  -26.95%  -26.87%  -20.62%  -72.33%  -25.95%  -28.32%  -37.61%  -10.21%  -36.77%  -23.50%  -10.77%  -16.03%  -23.42%
Separated season box             4      4  169032  -41.59%  -26.95%  -26.59%  -19.92%  -72.32%  -26.12%  -26.32%  -37.24%  -10.36%  -36.43%  -23.62%  -10.50%  -16.35%  -23.42%
Separated season box             4      4  168032  -41.46%  -26.95%  -25.27%  -19.76%  -72.21%  -26.13%  -28.49%  -37.34%  -10.48%  -36.32%  -23.66%   -9.55%  -16.43%  -23.46%
Separated season box             4      4  167032  -41.50%  -26.95%  -25.19%  -19.62%  -72.06%  -26.26%  -28.72%  -36.54%  -10.60%  -36.20%  -23.73%   -9.56%  -15.65%  -23.47%
Separated season box             4      4  166032  -41.43%  -26.95%  -25.26%  -19.22%  -72.95%  -26.36%  -26.97%  -35.85%  -10.71%  -33.68%  -22.66%   -9.50%  -16.71%  -23.47%
Separated season box             4      4  165032  -41.36%  -26.95%  -25.39%  -17.35%  -72.06%  -26.55%  -27.34%  -35.87%  -11.31%  -33.23%  -21.65%  -10.57%  -16.91%  -22.54%
Separated season box             4      4  133033  -41.26%  -26.95%  -26.92%  -15.17%  -72.03%  -25.73%  -27.42%  -36.12%  -10.69%  -34.36%  -21.53%   -7.13%  -15.59%  -22.52%

Leatherback turtle take reduction bin # 14 ( -65% to -70%)
10 best of 4577 scenarios at this take level with minimum fishing effort disruption
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action      #Mn     Nr Lon/Lat    TCC      FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season box             6      4  152032  -35.29%  -26.95%  -26.74%   -3.25%  -65.53%  -27.38%  -23.77%  -31.83%  -13.32%  -28.65%  -22.36%   -5.02%  -17.78%  -21.34%
Separated season box             6      4  151032  -39.24%  -26.95%  -26.23%   -3.15%  -65.58%  -28.01%  -28.65%  -31.74%  -13.25%  -26.73%  -22.93%   -4.35%  -17.36%  -21.27%
Separated season box             6      4  150032  -39.27%  -26.95%  -26.26%   -1.96%  -65.01%  -27.76%  -25.22%  -31.69%  -13.11%  -26.62%  -22.57%   -3.62%  -16.04%  -21.28%
Separated season box             6      4  161033  -33.12%  -26.95%  -25.72%   -2.23%  -65.66%  -27.58%  -25.64%  -31.55%  -12.72%  -29.36%  -22.34%   -4.52%  -17.99%  -21.22%
Separated season box             6      4  160033  -36.56%  -26.95%  -25.74%   -1.32%  -65.61%  -27.56%  -25.73%  -31.23%  -12.83%  -29.37%  -22.58%   -4.96%  -20.35%  -21.02%
Separated season box             6      4  159033  -38.89%  -26.95%  -25.32%   -1.61%  -65.49%  -27.59%  -25.83%  -31.22%  -12.94%  -29.33%  -23.25%   -5.13%  -20.15%  -21.03%
Separated season box             6      4  158033  -38.80%  -26.95%  -25.35%   -1.27%  -65.10%  -27.75%  -25.94%  -31.29%  -13.02%  -29.25%  -23.12%   -5.22%  -20.22%  -21.04%
Separated season box             6      4  157033  -38.72%  -26.95%  -25.39%    0.12%  -65.09%  -27.79%  -32.02%  -31.26%  -13.02%  -29.13%  -23.15%   -5.27%  -20.22%  -21.03%
Separated season box             6      4  165034  -39.26%  -26.95%  -25.58%   -6.35%  -65.99%  -27.23%  -32.60%  -33.95%  -12.62%  -31.96%  -22.76%   -2.95%  -17.35%  -20.06%
Separated season box             6      4  166034  -39.22%  -26.95%  -25.62%   -6.33%  -65.15%  -27.41%  -32.75%  -33.02%  -12.19%  -31.23%  -22.83%   -1.64%  -17.42%  -20.93%

Leatherback turtle take reduction bin # 13 : -60% to -65%:
10 best of 3720 scenarios at this take level with minimum fishing effort disruption
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Type of management action      #Mn     Nr Lon/Lat    SSD.     FEL      Rev      Log      Lea      Rid      Gre      Swo      Big      Alb      Yel      Blu      Mah      Opa
------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Separated season latitude        3      6      32  -35.75%  -19.20%  -19.33%  -37.12%  -61.90%  -12.53%  -22.63%  -36.01%   -4.20%  -25.07%   -7.62%  -15.69%   -6.73%  -14.33%
Separated season box             3      6  173031  -36.54%  -19.22%  -19.11%  -32.58%  -59.21%  -12.57%  -13.56%  -36.36%   -5.03%  -26.63%   -8.02%  -12.53%  -11.66%  -14.25%
Separated season box             4      6  149033  -33.51%  -26.95%  -26.17%    1.62%  -51.27%  -28.23%  -31.64%  -33.47%  -12.52%  -23.67%  -23.63%   -1.37%  -18.75%  -21.16%
Separated season box             4      6  148034  -37.36%  -26.95%  -25.33%    2.93%  -51.12%  -28.23%  -31.86%  -33.28%  -13.45%  -23.59%  -23.63%   -0.76%  -18.92%  -21.12%
Separated season box             4      6  147034  -37.13%  -26.95%  -25.97%    2.90%  -50.87%  -28.33%  -32.03%  -33.05%  -12.54%  -23.73%  -23.73%   -0.63%  -19.25%  -21.16%
Separated season box             6      6  145034  -36.98%  -26.95%  -26.92%    3.07%  -50.23%  -28.39%  -32.72%  -32.63%  -12.59%  -28.61%  -23.32%   -0.25%  -19.20%  -21.15%
Separated season box             4      6  147035  -37.37%  -26.95%  -25.13%    1.02%  -50.46%  -28.12%  -31.93%  -32.53%  -12.13%  -29.03%  -23.53%   -1.67%  -20.42%  -21.35%
Separated season box             4      6  150035  -37.26%  -26.95%  -25.11%    1.77%  -50.27%  -28.23%  -31.97%  -32.32%  -12.26%  -28.99%  -23.55%   -1.66%  -20.62%  -21.12%
Separated season box             4      6  152035  -37.21%  -26.95%  -25.32%    2.40%  -50.17%  -28.27%  -32.07%  -32.26%  -12.32%  -23.91%  -23.63%   -1.82%  -19.72%  -21.11%
Separated season box             4      6  135036  -37.47%  -26.95%  -25.85%   -2.76%  -50.72%  -28.62%  -32.26%  -31.23%  -12.03%  -32.38%  -23.52%   -0.64%  -19.33%  -21.20%
```

Type of management action	#Mn	Mo	Lon/Lat	FED	FEL	Ker	Leg	Lon	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Ops
Separated season latitude	2	5	30	-33.35%	-12.01%	-31.26%	-52.67%	-55.66%	0.46%	-3.19%	-37.66%	1.26%	-17.80%	3.78%	-21.85%	-2.79%	-5.40%
Separated season latitude	3	6	34	-33.25%	-19.00%	-22.36%	-25.12%	-56.46%	-22.36%	-23.93%	-31.47%	-5.31%	-25.03%	-10.72%	-9.82%	-12.25%	-14.96%
Separated season box	3	5	151032	-33.52%	-19.00%	-15.80%	-18.87%	-55.45%	-24.74%	-16.92%	-27.42%	-7.52%	-22.53%	-10.16%	-8.27%	-14.60%	-15.24%
Separated season box	3	6	171235	-33.53%	-19.00%	-15.22%	-20.33%	-56.85%	-23.92%	-17.28%	-27.96%	-5.92%	-24.46%	-10.26%	-8.37%	-14.04%	-15.24%
Separated season box	3	5	170233	-33.46%	-19.00%	-15.29%	-20.25%	-56.54%	-24.27%	-17.25%	-27.85%	-5.85%	-22.39%	-11.34%	-7.65%	-14.10%	-15.27%
Separated season box	3	5	153233	-33.31%	-19.00%	-15.42%	-17.28%	-56.27%	-24.22%	-17.32%	-27.55%	-7.17%	-22.75%	-11.40%	-7.17%	-14.43%	-15.70%
Separated season box	3	5	159233	-33.25%	-19.00%	-15.48%	-17.12%	-56.25%	-24.28%	-17.66%	-27.28%	-7.32%	-23.73%	-11.56%	-6.25%	-14.55%	-15.24%
Separated season box	3	6	157233	-33.22%	-19.00%	-15.57%	-16.56%	-56.07%	-24.32%	-17.82%	-27.32%	-7.65%	-23.67%	-11.65%	-5.82%	-14.74%	-15.25%
Separated season box	3	5	156233	-33.12%	-19.05%	-15.62%	-16.52%	-55.93%	-24.39%	-17.75%	-27.22%	-7.52%	-23.41%	-11.72%	-6.86%	-14.86%	-15.25%
Separated season box	3	6	155233	-32.95%	-19.33%	-15.72%	-15.28%	-55.25%	-24.54%	-18.32%	-27.26%	-7.65%	-23.03%	-11.82%	-7.31%	-15.06%	-15.27%

Leatherback turtle take reduction bin # 11 ; -50% to -55%;
10 best of 3335 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Mo	Lon/Lat	FED	FEL	Ker	Leg	Lon	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Ops
Separated season latitude	2	4	31	-29.46%	-12.06%	-13.46%	-44.53%	-54.20%	-1.24%	-6.03%	-25.21%	0.31%	-17.55%	-3.50%	-17.56%	-8.04%	-6.26%
Separated season latitude	2	4	32	-27.63%	-12.06%	-13.46%	-38.12%	-52.67%	-1.59%	-7.31%	-25.25%	0.35%	-17.53%	-1.40%	-13.92%	-5.25%	-6.45%
Separated season latitude	2	4	33	-25.22%	-12.06%	-10.69%	-32.72%	-52.68%	-2.57%	-7.33%	-22.34%	-1.14%	-13.36%	-2.83%	-11.12%	-5.05%	-7.40%
Separated season box	2	4	173032	-26.16%	-12.06%	-5.75%	-32.53%	-51.25%	-3.52%	2.75%	-23.25%	-0.67%	-14.93%	-1.68%	-21.62%	-8.63%	-6.55%
Separated season box	2	4	172032	-27.95%	-12.06%	-5.86%	-32.61%	-52.83%	-4.12%	2.73%	-23.39%	-0.32%	-14.86%	-2.07%	-12.83%	-9.06%	-6.64%
Separated season box	2	4	171032	-27.91%	-12.06%	-9.69%	-32.63%	-52.60%	-4.23%	2.39%	-22.73%	-0.39%	-13.81%	-2.25%	-13.23%	-9.65%	-6.75%
Separated season box	2	4	170032	-27.32%	-12.06%	-8.56%	-32.35%	-52.49%	-4.37%	2.36%	-22.32%	-1.21%	-13.32%	-2.30%	-12.39%	-9.85%	-6.84%
Separated season box	2	4	169032	-27.63%	-12.06%	-10.10%	-32.23%	-52.14%	-4.52%	2.26%	-21.82%	-1.48%	-13.05%	-2.52%	-12.14%	-10.07%	-6.81%
Separated season box	2	4	168032	-27.38%	-12.94%	-10.17%	-32.13%	-52.14%	-4.59%	2.11%	-21.59%	-1.81%	-12.96%	-2.63%	-11.25%	-10.05%	-6.92%
Separated season box	2	4	167032	-27.51%	-12.06%	-10.24%	-32.33%	-52.05%	-4.64%	1.85%	-21.36%	-1.77%	-12.82%	-2.74%	-11.67%	-10.23%	-6.96%

Leatherback turtle take reduction bin # 10 ; -45% to -50%;
10 best of 3460 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Mo	Lon/Lat	FED	FEL	Ker	Leg	Lon	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Ops
Separated season box	2	4	167032	-24.73%	-12.64%	-20.58%	-16.36%	-63.43%	-5.25%	-2.91%	-15.97%	-3.34%	-9.08%	-4.12%	-3.56%	-11.35%	-7.55%
Separated season box	2	4	162032	-24.35%	-12.64%	-20.66%	-12.25%	-63.65%	-5.32%	-2.39%	-16.64%	-3.51%	-6.91%	-4.33%	-6.23%	-12.25%	-7.61%
Separated season box	2	4	166032	-24.82%	-12.64%	-20.18%	-19.73%	-67.23%	-5.69%	-2.22%	-16.92%	-2.91%	-12.91%	-4.27%	-4.27%	-12.22%	-7.56%
Separated season box	2	4	167022	-24.76%	-12.64%	-20.27%	-19.57%	-67.22%	-5.34%	-2.38%	-16.66%	-3.23%	-11.75%	-4.36%	-6.63%	-12.62%	-7.55%
Separated season box	2	4	168032	-24.65%	-12.64%	-20.33%	-19.13%	-67.03%	-5.62%	-2.56%	-16.67%	-3.11%	-12.62%	-4.41%	-4.88%	-12.52%	-7.55%
Separated season box	2	4	165032	-24.52%	-12.64%	-20.45%	-17.75%	-66.20%	-5.75%	-2.33%	-16.63%	-3.27%	-12.22%	-4.51%	-5.53%	-12.72%	-7.53%
Separated season box	2	4	164032	-24.21%	-12.64%	-20.57%	-15.27%	-65.18%	-5.59%	-2.24%	-15.54%	-3.52%	-10.14%	-4.53%	-3.95%	-12.35%	-7.66%
Separated season box	2	4	173034	-24.11%	-12.64%	-20.28%	-15.59%	-65.30%	-5.36%	-2.25%	-16.60%	-3.37%	-12.63%	-4.77%	-1.51%	-10.59%	-7.53%
Separated season box	2	4	172034	-24.35%	-12.64%	-20.26%	-16.63%	-65.09%	-5.72%	-2.33%	-16.57%	-3.12%	-12.33%	-4.81%	-2.63%	-11.26%	-7.56%
Separated season box	2	4	171034	-22.33%	-12.64%	-20.25%	-15.35%	-65.01%	-5.82%	-2.35%	-16.29%	-3.22%	-11.51%	-4.85%	-2.94%	-11.27%	-7.56%

Leatherback turtle take reduction bin # 9 ; -40% to -45%
10 best of 4035 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Mo	Lon/Lat	FED	FEL	Ker	Leg	Lon	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Ops
Separated season box	2	4	160034	-22.15%	-13.24%	-10.68%	-4.19%	-61.23%	-7.24%	-4.35%	-12.63%	-6.87%	-7.72%	-5.69%	-1.35%	-13.20%	-7.85%
Separated season box	2	4	159034	-22.12%	-13.24%	-10.71%	-3.76%	-61.67%	-7.22%	-4.13%	-12.55%	-6.89%	-7.73%	-5.74%	-2.50%	-13.30%	-7.87%
Separated season box	2	4	158034	-22.01%	-13.24%	-10.73%	-3.61%	-62.77%	-7.14%	-4.24%	-12.53%	-6.94%	-7.69%	-5.78%	-1.56%	-13.37%	-7.87%
Separated season box	2	4	157034	-21.93%	-13.24%	-10.78%	-3.05%	-62.62%	-7.12%	-4.31%	-12.50%	-6.97%	-7.66%	-5.81%	-1.57%	-13.37%	-7.87%
Separated season box	2	4	156034	-21.93%	-13.24%	-10.79%	-2.93%	-62.57%	-7.22%	-4.32%	-12.47%	-5.50%	-7.66%	-5.93%	-1.42%	-13.44%	-7.86%
Separated season box	2	4	155034	-21.93%	-13.24%	-10.79%	-2.86%	-62.55%	-7.20%	-4.33%	-12.48%	-5.52%	-7.36%	-5.85%	-1.45%	-13.46%	-7.86%
Separated season box	2	4	154034	-21.85%	-13.24%	-10.82%	-2.85%	-62.54%	-7.22%	-4.35%	-12.43%	-5.52%	-7.35%	-5.85%	-1.45%	-13.46%	-7.86%
Separated season box	2	4	153034	-21.83%	-13.24%	-10.81%	-2.35%	-62.52%	-7.22%	-4.35%	-12.43%	-5.62%	-7.45%	-5.36%	-1.43%	-13.45%	-7.83%
Separated season box	2	4	152034	-21.83%	-13.24%	-10.82%	-2.33%	-62.39%	-7.22%	-4.35%	-12.33%	-5.57%	-7.37%	-5.38%	-1.23%	-13.47%	-7.83%
Separated season box	2	4	151034	-21.82%	-13.24%	-10.83%	-2.33%	-62.23%	-7.23%	-4.61%	-12.33%	-5.12%	-7.56%	-5.52%	-1.32%	-13.57%	-7.90%

APPENDIX E

Recommendations from Dr. John Hampton on Time/Area Closure Analysis for Turtle Take Reductions.

Management of Incidental Mortality of Turtles in the Hawaii Longline Fishery

John Hampton

Oceanic Fisheries Programme
Secretariat of the Pacific Community
B.P. D5, 98848 Noumea Cedex, New Caledonia
Email: JohnH@spc.int

Introduction

This is my personal review of the report entitled "Time/Area Closure Analysis for Turtle Take Reductions", written by Donald Kobayashi and Jeffrey Polovina of the National Marine Fisheries Service Honolulu laboratory (Kobayashi and Polovina 2000), and of the wider issue of management of incidental turtle mortality in the Hawaii longline fishery (HLF). The review was undertaken during a meeting of the review panel (Drs. Michael Sissenwine, Larry Crowder and myself) held in Honolulu on 29–31 March, 2000. The panel, with assistance from the report authors and other staff of the NMFS Honolulu laboratory, discussed the report and relevant background material in detail. Generally speaking, there appeared to be considerable agreement among the panel members regarding many of the issues under discussion. However, our mandate was to produce separate review reports; therefore this should be considered as my personal contribution in this respect.

The first section of my report presents some background information concerning the status of marine turtle populations in the Pacific, recent levels of incidental fishing mortality, and the relative impact of the HLF. This is not meant to be comprehensive, but I feel that a brief summary of the information provides a necessary context for the rest of my report. In the next section, I review the time/area closure analysis as a basis for making management decisions in the HLF. I then consider options, including (but not restricted to) the use of time/area closures, for the management of incidental mortality of turtles in the HLF. In the final section, I provide a summary of recommendations, including suggestions for further work that would have to be undertaken before implementation.

Background

Current status of Pacific turtle populations

In the Pacific, *leatherback turtles* are listed as endangered, with populations originating in southeast Asia and central America in severe decline (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1998a). The main causes of population decline are believed to be killing of nesting females at nesting beaches, harvesting of eggs, and incidental mortality caused by fisheries. In at least one location (Terengganu, Malaysia), a nesting population has been virtually eliminated due to near total harvesting of eggs (Chan and Liew 1996; Spotila et al. 1996). In the eastern Pacific, what was a large population nesting on beaches in Mexico and Costa Rica in the early 1980s had been reduced to less than 20% of that level by the mid-1990s. This decline was a result firstly of excessive egg harvesting and killing of nesting females (prohibited since the mid-1980s) and later because of incidental mortality by a range of fisheries (Eckert and Sarti 1997).

The *loggerhead turtle* is listed as a threatened species throughout the Pacific. In the North Pacific, loggerhead turtles appear to originate mainly from nesting beaches in Japan. Data on population trends are sparse, and what data are available from nest surveys in Japan indicate a high level of interannual variability. A decline in nesting activity was observed during the 1970s, but there are no clear and consistent trends since that time (Bolten et al. 1996, Fig. 1). Incidental mortality by fisheries is believed to be the main source of human-induced mortality, with some minor effects of harvest of nesting females on Japanese beaches.

The *olive ridley turtle* is listed as endangered for nesting populations in Mexico and threatened elsewhere. However, olive ridleys are the most abundant species of marine turtle in the Pacific, and there is evidence that the Mexico population is increasing (Márquez et al. 1996). Severe impacts on the population are thought to have occurred in the 1960s and 1970s, but recent population levels may now actually exceed pre-harvest levels (Márquez et al. 1996). Downlisting to threatened status has been suggested (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1998b).

Green turtle populations in the Pacific are variously listed as threatened or endangered, although the population that nests in the Northwest Hawaiian Islands appears to be healthy, due to effective protection at primary nesting areas (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1998c).

Fishery impacts on Pacific turtles

For *leatherback turtles*, probably the major sources of incidental fishing mortality have been the high-seas driftnet fishery, which is estimated to have killed at least 100 leatherbacks per year during the 1980s and early 1990s (Wetherall 1997), and the Chilean and Peruvian swordfish fisheries (both gillnet and longline), which are estimated to have killed at least 2,000 leatherbacks annually (Eckert and Sarti 1997) during the 1990s. There are no statistics available for the high-seas longline fisheries in the Pacific (mainly Japan, Korea and Taiwan), but it is possible that they also generate some incidental mortality of leatherback turtles. Based on this information, incidental fishing mortality of leatherback turtles may have exceeded 2,500 animals per year at times during the 1990s.

By contrast, the HLF has an estimated annual take of 166 leatherbacks, with an estimated annual mortality of 11 animals[1]. In comparison to the incidental mortality attributed to other fisheries, the HLF is a very minor source of leatherback turtle mortality. In fact, analysis using the TURTSIM model suggests that "annual incidental mortality of about 10 leatherbacks caused by the fishery (i.e., the HLF) is less than 1% of the total incidental mortality coefficient in these size classes consistent with recovery of the aggregate nesting population to 75% of its pristine abundance" (Wetherall 1997). Furthermore, Wetherall's analysis shows that leatherback turtle population trajectories are virtually identical when the current level of incidental mortality by the HLF, and no mortality by the HLF, are compared (Wetherall 1997, Fig. 13).

For *loggerhead turtles*, the North Pacific high-seas driftnet fishery was probably a major source of mortality during the 1980s and early 1990s, with about 800 estimated loggerhead mortalities in 1990–1991 during an intensive, one-year observer program. Other incidental mortality in non-U.S. longline fisheries operating in subtropical areas of the North Pacific also occurs, although few data are available.

Incidental mortality in the HLF is estimated at 65 loggerheads annually, which represents a mortality coefficient of about 0.002 per year (Wetherall 1997). Wetherall (1997) notes that "this is only about 5% of the total incidental mortality coefficient of stage P2 turtles consistent with recovery of the nesting population to 75% of its pristine abundance, assuming there is no human-induced mortality to other size classes". While there is uncertainty about the latter assumption, it is reasonable to conclude that the impact of the HLF is relatively minor.

---

[1] Mortality is computed by summing the estimates of the numbers of turtles that are retrieved dead and 29% of those that are retrieved alive but hooked internally. Recent satellite telemetry studies (on loggerhead turtles) have not detected significant differences in behavior of internally-hooked versus externally-hooked turtles, so the assumed 29% post-hooking mortality may in fact be an over-estimate.

Overall fishery impacts on *olive ridley* and *green turtles* are difficult to define given available information. For olive ridleys, there is likely to be incidental mortality in tropical longline fisheries throughout the Pacific. In the HLF, annual incidental mortality is estimated at 37. For Hawaiian green turtles, the HLF is probably the only longline fishery that could potentially cause incidental fishing mortality (because of their distribution close to nesting sites in the Northwest Hawaiian Islands), but mortality is estimated to be zero on the basis of observer data. The impact of the HLF on both of these species is generally considered to be small.

Review of NMFS time/area closure analysis

Description of the study

The analysis employed what might be called a "brute force" approach, consisting of a number of steps:

1. General additive models (GAMs) were fitted to the available observer data for 1994–1998 for each of the four turtle species. Predictive variables for leatherbacks included latitude and moon phase (nonlinear), longitude (linear) and month (categorical). Predictive variables for loggerheads included latitude, longitude, moon phase, and sea surface temperature (nonlinear), and month and year (categorical). The underlying error structure in the dependent variable (turtle takes per longline set) was assumed to be Poisson.
2. The GAMs were then used to predict the impact on turtle take for each species under 362,194 management scenarios involving closed areas, closed seasons, or a combination of the two. For each scenario, turtle take predictions were generated by applying the GAMs to temporal and spatial distributions of longline effort data (1994–1998 average) that had been modified by the particular management scenario. Closed areas were specified as either north of a certain latitude or north of a certain latitude and east of a certain longitude. Closed seasons were specified as one or more consecutive months. Closed areas and seasons could be applied in "separated" mode, where a closed area was imposed for all months and a closed season applied to all areas, or in "merged" mode, where a closed area was imposed over a specified number of months. For closed areas and seasons, the effort that would have occurred in those areas/seasons was assumed to be lost ("static" mode) or was assumed to reallocate ("dynamic" mode) according to the historical distributions of effort by trip type (swordfish, mixed and tuna trips) in the areas/seasons remaining open. Effort from closed areas was completely reallocated, while for closed seasons, one half of the effort from each of the first and last months of the closed season was reallocated to each of the adjacent open-season months.
3. For each management scenario, the impact on the fishery was estimated in two ways: (i) the percentage of longline sets lost or reallocated ("fishing effort disruption") and (ii) the predicted impact on fishery revenue. The latter was calculated assuming historical target or incidental fish species CPUE in fished areas could be maintained, and using 1998 fish prices for each species, month, and trip type.
4. The management scenario results were then binned by percentage leatherback take reduction categories, and the results in each bin sorted according to various optimality criteria. The primary optimality criterion was fishing effort disruption, although fish catch revenue was also used. Other results, including percentage changes in takes of the other three turtle species (predicted using the GAMs) and changes in fish catches, were also computed. The optimal solutions for each bin formed a so-called "efficient frontier", which essentially defines the relationship between leatherback turtle take and minimum fishery impact.

5. For each of the optimal management scenarios (optimized for fishing effort disruption) on the leatherback efficient frontier, a bootstrap procedure was used to estimate variability. This consisted of generating 100 pseudo-data sets by random sampling of the observer data, and applying steps 1 and 2 above to each pseudo-data set. The 2.5 and 97.5 percentiles of fishing effort disruption and leatherback take reduction were used to approximate the 95% confidence intervals for the frontier.

General assessment

Overall, the statistical approach adopted appeared to be sound, and the analysis thorough. In my view, the authors did a commendable job in the time available to them. However, there are several aspects of the analysis that need to be highlighted as being of particular importance in interpreting the results.

Paucity of data

Paucity of data was a serious problem for this analysis. The observer data consisted of 2,812 observed sets over a five-year period. This seems like a large number, but the number of observed leatherback takes, for example, was only 38, which means that at least 98.6% of sets were "zero" observations in terms of leatherback takes. It would seem to be enormously optimistic to think that such an observed data set could be reliably extrapolated to estimates of the take per longline set at a one-degree square month resolution. One outcome of the sparseness of the data is that if there were zero observations in a particular month, then the model cannot predict any takes for that month, month being a categorical rather than a smoothed variable. This was the case for May and June with loggerheads, and for August with leatherbacks (see Fig. 6 of the report). In the case of leatherbacks, there is an apparent peak of takes in April and May that results from about 8 observed takes in each of those months over five years. This apparent seasonality has a large effect on the analysis and results in a tendency to rate highly the seasonal closures that include those months. My concern is that this apparent seasonality may simply be an artifact of sampling error that arises because of the low number of positive take observations. While such uncertainty can in principle be dealt with using the bootstrap procedure employed, the bootstrapping was only carried out for those management scenarios that were rated as optimal on the basis of the observed data. It is likely that other management scenarios would have rated as optimal for the individual bootstrapped data sets and this was not accounted for in the analysis.

Assumptions regarding effort redistribution

An inherent weakness of this type of analysis is the need to make assumptions about what happens to the effort that would otherwise have occurred in an area or season now deemed to be closed. This is more of an issue with closed areas than with closed seasons. For closed areas, the "static" mode is obviously an over-simplification as it is unlikely that all of the effected effort would simply disappear. On the other hand, redistribution of the effort into the remaining open areas based on the historical effort distribution may also be overly simplistic. Depending on the severity of the management scenario, it is likely that some effort would indeed be lost, e.g. vessels would leave the fishery. This may in fact be likely to occur even at relatively low percentages of effort disruption because effort redistribution is assumed to occur within trip type (but the percentage effort disruption is expressed across all trip types). As an example, if a particular management scenario had a large effect on effort by swordfish trips, then the model may attempt to reallocate a large amount of swordfish trip effort into an unreasonably small number of area strata. However, this might not show up as a large percentage effort disruption, as swordfish trips make up a relatively small proportion of the total effort. Also, vessels that remain in the fishery may not in fact fish according to their historical average behavior. One expectation might be that vessels would tend to fish as close to the boundaries of a closed area as they could (which I understand is currently happening in respect of the emergency closed area). Vessels might also fish in areas that have not been fished previously. This type of behavior could result in the closed area not having the predicted effect in terms of turtle take reduction.

Measurement of fishery impacts

An attempt is made in the analysis to estimate fishery revenue impacts. Apart from being dependent on the effort redistribution assumption *per se*, the analysis also assumes that the CPUE of target and incidental species (i.e. those species which generate revenue) will be unaffected by the effort redistribution. Obviously, if a large amount of effort is fishing in too small an area, competitive effects may reduce CPUE and thus revenue. In 1993, the average net return for a Hawaii-based longliner was only $27,000, from an annual revenue of $504,000 (Hamilton et al. 1996). This would suggest that the fishery has very limited capability to absorb any negative impacting of revenue.

The various management scenarios may also impact the costs of fishing effort. For example, the adjusted effort distribution may require greater travelling time and therefore higher average fuel and other costs per day fishing. The average cost of an additional travelling day per trip by Hawaii-based longliners in 1993 has been calculated at $4,000 (Hamilton et al. 1996). Assuming eight trips per year, the additional costs of $32,000 would more than cancel out the average annual net return of $27,000. The cost side of fishery impacts, including downstream effects, needs further detailed analysis.

Management options

It seems somewhat strange to me that the management options under consideration have been limited to time/area closures. I understand that the court order setting the terms of the injunction focused exclusively on time/area closures in both its emergency closure order and in the possible future modification of that closure. My view is that this restriction, if indeed it is a restriction, unreasonably limits the management actions that might be taken, some of which may be more effective than time/area closures. In fact, there would seem to be few reasons *a priori* to believe that time/area closures would be an effective management measure for leatherback turtles at least. This is particularly the case because of (1) the absence of international arrangements to manage the incidental mortality of turtles by fisheries targeting tuna and other pelagic species in the Pacific Ocean and (2) the absence of comparable domestic management controls on fishing outside the jurisdiction of the Western Pacific Regional Fishery Management Council. Therefore, as well as discussing options for time/area closures, I have also discussed two other possible types of management action that I believe should be given careful consideration.

Criteria for selecting specific options

In most fisheries, it is the norm that specific management measures relate to the achievement of one or more stated management objectives. In this particular case, there is no such stated objective, other than perhaps to "reduce turtle takes in the HLF". This then raises the questions "reduce by how much?", "to what end?", and "at what cost?". The question of how much turtle takes should be, or need to be, reduced in the HLF is obviously related to the second question, "to what end?". This latter question should, in turn, be related to turtle conservation objectives at the population level for the various species.

It is quite obvious from the information presented above and in the various background information available to the panel (particularly Wetherall 1997) that, short of a massive increase in fishing effort by the HLF, whatever management action is taken in this fishery will have no measurable impact on any of the turtle stocks under consideration. One can only conclude, therefore, that the objectives of any management action in this fishery are to a large extent "symbolic". This makes selection of turtle take reduction targets for the HLF a fairly arbitrary exercise.

During the panel meeting last week, there was some discussion of what would be an appropriate turtle take (with emphasis on leatherbacks) reduction target. Targets in the vicinity of 50% were specifically discussed. The application of such a criterion would likely impose far more drastic restrictions on the fishery than the closure ordered by Judge Ezra in November. In my judgement, such severe restrictions are unwarranted because they would be more of a "symbolic" exercise than one that might be expected to be of significant benefit to turtle populations.

In view of the above, the cost (to the industry and the community) of any proposed management action needs to be considered very carefully, particularly in view of the low average net returns currently generated by the fishery (Hamilton et al. 1996). The NMFS analysis made an attempt to define the costs of various management scenarios in terms of fishing effort disruption and changes in fish catch revenue. These are useful measures for comparing the impact of alternative time/area closures, but fall well short of estimating what the real costs of the various actions would be. As noted earlier, a full analysis of the costs of any proposed management actions should be carried out before implementation.

In announcing the details of his emergency closure, Judge Ezra noted that the objective of the Court was to craft an injunction "which does the most on the one hand to protect the resources (i.e. turtles) but does the least on the other hand to hurt the economics of the industry". The NMFS analysis assessed both the turtle take and fishery impacts of the Court-ordered emergency closure, so it is possible to use this information to limit possible management actions to those that provide at least that level of anticipated turtle take reduction for both leatherback and loggerhead turtles, but that impose no greater impact on the fishery. The predicted impacts of the emergency closure are listed in Table 1 of the time/area closure analysis. I chose the "dynamic" assumption for effort reallocation as being the more realistic of the two. Also, because of the large uncertainty in the predicted impacts, I believe it would be appropriate to choose scenarios that result in a low probability of the emergency closure impact on leatherback take reduction (greatest concern being for leatherbacks) not being achieved. Using the 2.5 percentile in Fig. 11 of the time/area closure analysis to define "low probability", the -4% estimated impact of the emergency closure on leatherback take would become approximately -20% as a take reduction target. In other words, it would be necessary to aim for at least -20% in order to be 97.5% certain of achieving at least -4%. For fishing impact, I have preferred to use fishing effort disruption as the criterion, as this makes fewer assumptions about effort reallocation and resulting fish catch. These criteria are listed in Table 1 below.

Table 1 . Criteria for considering time/area closures.

	Criteria	
Leatherback take reduction	*At least*	20%
Loggerhead take reduction	*At least*	22%
Fishing effort disruption	*At most*	13%

Time-area closures

The time/area closure analysis provides analysis of a large range of management scenarios. I have extracted scenarios from Appendix 1 (expanded to the 50 best scenarios per leatherback take bin) of the time/area closure analysis that satisfy the criteria given above, i.e. provide equal or greater predicted reductions in both leatherback and loggerhead turtle takes with equal or lesser impact on the fisheries, according to the criteria in Table 1. The best ten options satisfying these criteria, in decreasing order of leatherback take reduction, are listed in Table 2. Likewise, the ten best options satisfying the criteria, in increasing order of fishing effort disruption, are listed in Table 3. Within Table 2, fishing effort disruption was the limiting criterion, and there are probably no significant differences among any of the closures listed in terms of leatherback take reduction and fishing effort disruption. However, several (1, 6, 7, and 10) perform better in terms of loggerhead take reduction. Within Table 3, leatherback take reduction was the limiting criterion. There are probably no significant differences among any of the closures listed in Table 3 for the leatherback criterion, but there are some differences in the loggerhead and fishing effort disruption criteria. Regarding fishing effort disruption, even where differences among closures appear to be slight, there may well be significant differences when the real costs to the industry are considered, and these will need to be assessed in due course. Of additional concern is that fishing effort disruption is expressed across the entire HLF, where is it clear that the closures listed in Tables 2 and 3 would have a disproportionate effect on the swordfish and mixed-trip vessel categories. The effort disruption to this component of the HLF might well be greater than 50%, which might not allow profitable operations. In assessing any closure options, the impact (and costs) to the swordfish and mixed trip sector must be taken into consideration.

Table 2. The ten best time/area closure options satisfying the criteria in Table 1, listed in decreasing order of leatherback take reduction.

Closure (all merged season/area)	Leatherback take reduction %	Loggerhead take reduction %	Fishing effort disruption %
1. North of 28°N, May–Jan	23.05	51.39	12.64
2. North of 28°N, east of 171°W, Apr–Jan	22.49	34.86	12.68
3. North of 30°N, Sep–Jul	22.18	42.43	12.55
4. North of 28°N, east of 170°W, Apr–Jan	22.15	34.05	12.36
5. North of 27°N, east of 166°W, Apr–Jan	22.09	29.83	12.54
6. North of 29°N, May–Jan	22.06	49.39	11.20
7. North of 30°N, Apr–Feb	21.97	49.02	11.93
8. North of 28°N, east of 169°W, Apr–Jan	21.63	32.49	11.97
9. North of 28°N, east of 168°W, Apr–Jan	21.56	31.69	11.61
10. North of 28°N, Jun–Jan	21.55	51.39	11.97

Table 3. The ten best time/area closure options satisfying the criteria in Table 1, listed in increasing order of fishing effort disruption.

Closure (all merged season/area)	Leatherback take reduction %	Loggerhead take reduction %	Fishing effort disruption %
1. North of 31°N, Sep–Jul	20.03	35.26	8.62
2. North of 31°N, Apr–Feb	20.01	42.54	9.26
3. North of 30°N, Jun–Jan	20.21	44.88	9.49
4. North of 31°N, all months	20.08	42.67	9.50
5. North of 30°N, May–Jan	20.62	44.88	9.64
6. North of 30°N, Apr–Jan	21.23	44.86	10.02
7. North of 29°N, Apr–Dec	20.53	32.09	10.27
8. North of 26°N, Sep–Jan	20.24	42.99	10.29
9. North of 29°N, Jul–Jan	20.68	49.38	10.46
10. North of 29°N, Jun–Jan	21.06	49.39	10.79

Enhanced monitoring and direct management of turtle takes

Time/area closures appear to be a fairly "blunt instrument" for the management of turtle incidental mortality in the HLF. This is particularly the case for leatherback turtles, where there is not a particularly clear separation of the temporal and spatial distributions of take probability and fishing effort. The paucity of data regarding take distribution and the distribution of the turtles themselves compounds the problem.

Time/area closures, as they have been used by the Court and NMFS in conducting the time/area closure analysis, imply zero fishing activity within particular closed areas and/or seasons. I believe that a viable alternative to this would be to construct areas (it would not work as well for seasons for logistical reasons) that instead of being closed to fishing would be considered "zones of enhanced monitoring and direct management of turtle takes". I envisage that the process might work along the following lines:

1. Define a high-take zone to be subject to enhanced monitoring and direct take management. This zone could be defined using an analysis similar to that undertaken for time/area closures.
2. Fishing would only be permitted in this zone when a scientific observer was on board the vessel.
3. The observer would record turtle takes and communicate this in real time to NMFS. The observer would collect the range of data concerning turtle interactions that is currently collected and be responsible for all aspects of turtle handling (de-hooking, resuscitation, release, etc.).
4. When the observed take in the zone reached a pre-determined level, all fishing in the zone would cease for the remainder of the year. I imagine that the maximum anticipated incidental takes specified in the 1998 NMFS Biological Opinion could be used as a basis for calculating the allowable takes for the high-take zone.

There would be a range of benefits associated with this type of management approach. Some of these would include:

1. Information regarding turtle take would be greatly enhanced by having 100% observer coverage in the high-take zone. Observer coverage at the current level of about 5% (at least) would still be required in other areas of the fishery.

2. The decision on whether or not to fish in the high-take zone would be made by vessel operators, thus giving them greater operational flexibility than would be the case with a closed area. A factor in the decision would undoubtedly be what portion, if any, of the observer cost would be borne by the vessel and what portion by NMFS.
3. The effort disruption effect of the management action would not be as great as for a closed area as some vessels would presumably choose to fish in the area with an observer on board. This would reduce the uncertainty regarding the effort redistribution and its resulting impact on turtle takes.
4. Management action to close the zone to further fishing would be based on perfect information on the variable that is being managed, i.e. turtle take.
5. The probability of injury or mortality of turtles due to interactions with the fishing gear would be minimized through the presence of observers who would be trained in handling techniques.
6. The presence of observers monitoring a significant percentage of all turtle interactions would provide research opportunities that could greatly enhance knowledge of turtle biology and longline impacts in areas such as horizontal and vertical movement behavior (through the attachment of satellite transmitters), the size, species and sex composition of turtle takes, fishing gear modifications to mitigate takes, the incidence of disease in turtle populations, and many others. Greater knowledge in these areas would not only be of benefit in managing the HLF, but may also be of benefit in the management of other fisheries that have a much greater impact on turtles than the HLF. In other words, this might actually make a difference.
7. This type of management action may allow a viable swordfish fishery in Hawaii to continue. It is not clear that this would be the case for a time/area closure, even where the percentage effort disruption is limited, because of differential impacts on the swordfish component of the fishery.

The size and configuration of the enhanced monitoring zone could be chosen following an analysis much like that already carried out. In fact, the "static" estimates of effort loss for any particular management scenario might be used to determine the maximum additional observer resources that would be required for that scenario. Some rough calculations suggest that a four to five-fold increase in the current level of observer trips would be necessary. Naturally, observer program cost would be a factor to consider in specifying the zone. However, it may still be possible to target a significantly larger leatherback take percentage (than that used for the time/area closure criteria – possibly 50% or greater) for enhanced monitoring at a lesser cost than would have occurred in a closure scenario. In any case, the issue of observer program cost and who pays is important, and this would need to be resolved between NMFS and the industry.

Management of the swordfish component of the HLF

The available observer data indicate that a high proportion of leatherback and loggerhead (in particular) takes are attributable to either swordfish or mixed trip types. It is for this reason that highly ranked time/area closures in the NMFS analysis have disproportionately high impact on this component of the HLF. This raises the question of whether it would be more effective to focus management efforts to reduce turtle takes explicitly on the swordfish/mixed component of the fleet. While trip type (i.e. swordfish, mixed, or tuna) was removed from the GAM analysis at an early stage in favor of a latitude effect, it is possible that a model that included trip type but excluded latitude and longitude might have provided almost as good a fit to the observer data as the model ultimately used. If this was the case, management scenarios with controls on the swordfish/mixed fleet might have performed well. Controls could be based on a form of effort limitation or possibly swordfish catch limitation. I would tend to favor the former as it would be difficult to allow for natural variability in swordfish abundance or availability in framing catch controls. Effort controls might be specified as allowing a certain number of swordfish and mixed trips per year. It is not possible to frame explicit recommendations at this stage as this would require additional analysis.

Summary of recommendations

It is clear that the reduction of incidental fishing mortality on Pacific turtle populations will require a sustained and widespread international effort if it is to be of significant benefit to depleted populations. It is equally clear that unilateral action to reduce incidental turtle mortality in the HLF will not, by itself, have any measurable impact on the populations. It is for this reason that I strongly favor recommendation 1, below, over recommendations 2 and 3. My summary of recommendations, in preferred order, with follow-up analyses required, are as follows:

Recommendation 1

My overall preference would be to adopt the approach outlined above of establishing a zone of enhanced monitoring and direct management of turtle takes. I believe that this approach would have significant advantages in reducing uncertainty regarding actual take levels, creating opportunities for research that might bring widespread benefits to turtle populations, and promoting correct handling of turtles taken on longlines thus minimizing injury and mortality.

Follow-up analysis required:

- Estimation of observer costs;
- Identification of optimum enhanced monitoring zones to maximize leatherback and loggerhead take observation while minimizing observer program costs;
- Estimation of leatherback and loggerhead take limits in the enhanced monitoring zone.

Recommendation 2

If time/area closures are unavoidable, I would recommend that the options listed in Tables 2 and 3 above be subject to further analysis.

Follow-up analysis required:

- Estimation of costs of fishing effort disruption, including the differential impacts on the tuna, mixed, and swordfish components of the HLF;
- Assess effort redistribution/loss hypotheses by examination of actual effort redistribution and loss (from VMS or logbook data) in reaction to the emergency closed area;
- If appropriate, re-run analyses including revised effort/loss redistribution hypotheses.

Recommendation 3

Examine the feasibility of effort controls on the swordfish component of the HLF.

Follow-up analysis required

- Re-fit GAMs including trip type as a categorical variable in place of latitude and longitude;
- If appropriate, examine the feasibility and efficacy of management scenarios involving limitation of swordfish/mixed trips.

References

Bolten, A.B., Wethe
Pacific Ocean
NOAA Techni
Chan, E.-H., and L
Malaysia, 195
Eckert, S.A., and Sa
leatherback nes
Hamilton, M.S, Curt
domestic longl
96-03, JIMAR
Kobayashi, D.R., and
Draft manuscri
Service, Honolu
Márquez-M, R., Peña
olivacea) show
5-7.
National Marine Fishe
U.S. Pacific pop
Fisheries Service
National Marine Fisher
U.S. Pacific popu
Fisheries Service,
National Marine Fisher
U.S. Pacific popu
Service, Silver Sp
Spotila, J.R., Dunham,
1996. Worldwide
going extinct? Ch
Wetherall, J.A. 1997.
assessment of pop
National Marine F

References

Bolten, A.B., Wetherall, J.A., Balazs, G.H., and Pooley, S.G. 1996. Status of marine turtles in the Pacific Ocean relevant to incidental take in the Hawaii-based pelagic longline fishery. NOAA Technical Memorandum NMFS, NOAA-TM-NMFS-SWFSC-230.

Chan, E.-H., and Liew, H.-C. 1996. Decline of the leatherback population in Terengganu, Malaysia, 1956–1995. *Chelonian Conservation and Biology* 2: 196–203.

Eckert, S.A., and Sarti, L. 1997. Distant fisheries implicated in the loss of the world's largest leatherback nesting population. *Marine Turtle Newsletter* 78: 2–7.

Hamilton, M.S, Curtis, R.E, and Travis, M.D. 1996. Cost-earnings study of the Hawaii-based domestic longline fleet. Joint Institute for Marine and Atmospheric Research, SOEST 96–03, JIMAR Contribution 96–300.

Kobayashi, D.R., and Polovina, J.J. 2000. Time/area closure analysis of turtle take reductions. Draft manuscript (March 21, 2000). Honolulu Laboratory, National Marine Fisheries Service, Honolulu, HI.

Márquez-M, R., Peñaflores, C., and Vasconcelos, J. 1996. Olive ridley turtles (*Lepidochelys olivacea*) show signs of recovery at La Escobilla, Oaxaca. *Marine Turtle Newsletter* 73: 5–7.

National Marine Fisheries Service and U.S. Fish and Wildlife Service, 1998a. Recovery plan for U.S. Pacific populations of the leatherback turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service 1998b. Recovery plan for U.S. Pacific populations of the olive ridley turtle (*Lepidochelys olivacea*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service 1998c. Recovery plan for U.S. Pacific populations of the green turtle (*Chelonia mydas*). National Marine Fisheries Service, Silver Spring, MD.

Spotila, J.R., Dunham, A.E., Leslie, A.J., Steyermark, A.C., Plotkin, P.T., and Paladino, F.V. 1996. Worldwide population decline of *Dermochelys coriacea*: are leatherback turtles going extinct? *Chelonian Conservation Biology* 2: 209–222.

Wetherall, J.A. 1997. Mortality of sea turtles in the Hawaii longline fishery: a preliminary assessment of population impacts. Administrative Report H-97-07. Honolulu Laboratory, National Marine Fisheries Service, Honolulu, HI.

APPENDIX F

ecommendations from Dr. Michael Sissenwine on Time/Area Closure Analysis for Turtle Take Reductions.

:OMMENDATION ON TIME/AREA CLOSURE OF THE LONGLINE FISHER NDUCTED BY HAWAII-BASED VESSELS

By

Michael P. Sissenwine

Introduction

document was prepared in response to an injunction issued in a lawsuit titled "Center for ne Conservation v. NMFS" (Civ. No. 99-00152 (DAE) (D.Haw.). The suit concerns the g (i.e., hooking or entanglement, sometimes leading to serious injuries and/or death) of sea s in the longline fishery conducted by Hawaii-based vessels (referred to as the HLL fishery). injunction directed NMFS to prohibit Hawaii-based longliners from fishing north of 28 es N between 168 degrees W and 150 degrees W; conduct an analysis of spatial and temporal ctions between sea turtles and the HLL fishery; and convene a panel with members selected rties to the suit to make individual recommendations on time/area closures. I am one of the bers of the panel.

ct the Northeast Fisheries Science Center of the National Marine Fisheries Service. For five years I served as the Senior Scientist of NMFS. I have broad experience conducting eading research in support of conservation and management of living marine resources. ever, I have virtually no firsthand knowledge of the HLL fishery or of the biology, ecology pulation status of sea turtles in the Pacific Ocean basin. Prior to being requested to serve e aforementioned panel, I had no knowledge of this lawsuit. At no time has any official of MFS, or anyone else, expressed any views to me indicating the type of recommendation that prefer. I am confident that I have been able to participate on the panel with an open mind, hat my recommendations are solely based on an objective consideration of the available ific information.

erstand that it is the specific responsibility of panel members to make time/area closure mendations aimed at reducing takes of sea turtles in the HLL fishery. However, I think it portant to put the panel's assignment into context. Recommendations on time/area closures d be considered in the context of the relative impact of the HLL fishery on sea turtles, ility of time/area closures as a method of reducing the take of sea turtles, and the spatial and ral overlap between the HLL fishery and longline fishing by other vessels.

the sea turtles taken by the HLL fishery are protected under the U.S. Endangered Species The recent decline of adult female leatherback turtles on nesting beaches along the West of Mexico is a matter of particular concern, and incidental takes in fisheries are thought to important threat to leatherback turtles (NMFS and USFWS. 1998. Recovery plan for U.S. c Population of Leatherback Turtles. NMFS, Silver Spring, MD. 65p.). However, the number of takes in the HLL fishery are orders of magnitude lower than that thought to occurred in other fisheries (e.g. off the coast of Chile). Thus, reducing the take of leather sea turtles by the HLL fishery probably will only make a minor contribution to conser leatherback sea turtles.

In order for a time/area closure to be suitable for reducing the incidental take of turtles w minimizing adverse impacts on the fishery, the turtles' distribution must have predict concentrations (in time and space) that have minimal overlap with concentrations of potent high rates of fish catch. A priori, there is no reason to believe that the turtles or the fishery distributed in this manner. With only a small number of observed turtle takes (e.g. 38 in five y for leatherbacks), it is impossible to estimate the distribution of turtles with much precision. T using a time/area closure to reduce the incidental take of sea turtles could be a "blunt tool" (causing significant impact on the fishery) and/or it is likely to be uncertain in terms o effectiveness.

Even if there are suitable time/area closures to achieve objectives for the HLL fishery, i important to recognize that benefits for the turtles may be undermined by other fishing acti that is not subject to the closure. For example, U.S. vessels that are not subject to Fish Management Plans prepared by the Western Pacific Fishery Management Council (e.g., vess fishing out of California), and foreign vessels, may continue to fish in a time/area closed to l line vessels from Hawaii. Attachment 1, derived from the South Pacific Commission's data b by panel member John Hampton, indicates that foreign fishing effort in the emergency closed a mandated by the injunction, is several times greater than U.S. fishing effort.

Description of NMFS Time/Area Closure Analysis

The NMFS Time/Area Closure Analysis for Turtle Take Reduction (Kobayashi and Polovi 3/24/2000) uses a General Additive Model (GAM) to develop a predictive model of the tur takes per longline set, by turtle species. The model is based on 1994-1998 observer data for 28 longline sets. The observed takes of turtles were 133, 38, 24 and 7, for loggerhead, leatherbac olive ridley and green sea turtles, respectively. The analysis considers latitude, longitude, mon sea surface temperature, moon phase and fishing trip type (i.e. targeting swordfish, tunas, o mixture of species) as explanatory variables.

The GAM model was applied to 55,785 logbook reports of sets to predict the take of turtles fishing trips that did not have observers. The next step was to systematically calculate t predicted number of turtle takes, by species, that would have occurred for time/area closur specified by all combinations of months, areas north of integer values of longitude from degrees N to 40 degrees N, and/or areas east of integer values of latitude from 174 degrees W 145 degrees W. A total of 180,597 closure options were considered.

For each option, the fractional change in turtle takes by species was estimated in order to indica the conservation benefits for turtles. As an indicator of the adverse effect of each closure optio the fishery, the fraction of total fishing effort that is disturbed (FED) by the closure (i.e., the fort that would have been expended in the closure) was calculated. However, fishing effort sturbance is likely to overemphasize the impact on the fishery since effort may be redeployed tside of the closure, thus producing catch and revenue. The NMFS analysis considers both ses where disturbed effort is not redeployed and cases where it is redeployed. I consider the ter more realistic, and only these model results are considered in the remainder of this cument. The analysis redeploys effort disturbed by an area closure to outside of the closure to duce the average catch per unit effort within trip types, by month, for open areas. For time sures, effort from the first month of the closure is assumed to be redeployed equally in months jacent to the closure. Effort from additional closed months is assumed lost. Thus, the analysis o calculates the fractional fishing effort loss (FEL) for all options. Finally, it calculates the ctional change in catch for the principle species landed by the fishery, and the change in enue (REV) by applying an estimate of the recent average price by species.

s impractical to report or examine the large number of closure options included in the analysis; wever they can be displayed in a plot. Attachment 2 from the NMFS analysis is a two nensional plot of the options for axes of fishing effort disturbance and fractional savings of therback turtles. The choice of the fractional savings of leatherback turtles as one axis reflects author's of the NMFS report belief that priority will be given to reducing the take of therback turtles relative to other species. They selected FED as an indicator of impact on the hery because FED could be calculated with minimal assumptions compared to calculating FEL d REV. To further summarize the time/area closures, the NMFS analysis estimated a so-called ficient frontier" which indicates the least amount of fishing effort disturbance that is necessary achieve a particular level of reduction in turtle takes (Attachment 3). For example, the efficient ntier indicates that, at a minimum, about 27% of fishing effort must be disturbed to reduce therback turtle takes by about 50%. The report of the NMFS analysis also included a series of pendices that give details about the 10 best (i.e. minimum FED) time/area closures for 5% bins leatherback turtle take reduction.

e reductions in revenue for the time/area closures that correspond to the efficient frontier for hing effort disturbance were also calculated by NMFS (Attachment 4). These values of enue reduction are not the minimum amount that can be achieved for particular levels of therback turtle reduction. Based on the assumptions made in the analysis, there were some e/area options for which the analysis indicates almost no reduction in revenues even when tle takes are virtually eliminated. However, these options were not considered realistic. For ample, such options might require that the entire fleet be able to maintain a high catch per unit fort with all effort concentrated into a small time and area. In order to help judge how optimal options along the FED efficient frontier might be in terms of REV, the panel asked MFS to plot values of FED against REV for all options (Attachment 5). I used Attachments nd 4 to derive (FED, REV) points that correspond to the FED efficient frontier. These points re added to Attachment 5 (as x's). The location of the x's indicate that the revenue reductions ng the efficient frontier for FED are generally low compared to most of the time/area closures. ere are some closures with less reduction in revenues, but they do not necessarily perform well with respect to reducing turtle takes and/or they may be unrealistic in terms of econo assumptions. Therefore, I conclude that the information in Attachment 4 should be indicativ the minimal impact on revenues that is necessary to achieve particular levels of reductio leatherback turtle takes.

The NMFS analysis also provides a lot of information on savings of leatherback turtles rela to savings of other species of turtles. For example, Attachment 6 from the NMFS report indic that there are options that can achieve substantial reductions in both leatherback turtle loggerhead turtle takes.

The review of the NMFS time/area closure analysis is included in this report for complete It is not intended to substitute for the description of the analysis included in the NMFS rep The latter is a more complete and authoritative source of information about the analysis.

Conclusion about the NMFS Time/Area Closure Analysis

My overall conclusion about the Time/Area Closure Analysis conducted by NMFS is that it technically sound. The analytical method used is appropriate for the purpose of providin scientific basis for evaluating options for time/area closures to reduce sea turtle takes. Gene additive models (GAM) allow multiple non-linear effects to be modeled. Explanatory variab may be either continuous or categorical. This flexibility makes the GAM approach superior other commonly used modeling approaches (e.g., General Linear Models, ANOVA) f predicting turtle takes per set. NMFS used GAM to analyze observer data to model turtle tak per unit effort, and it applied model results to effort data from logbooks to model the number takes by time and area. Data from 1994-1998 were used. I believe this is the best available da for the purposes at hand.

While the NMFS analysis is technically sound, and it is an appropriate basis for evaluati time/area closure options, it has limitations. I think it is important to keep the followi limitations in mind when using the analysis to evaluate options:

1. Predictions of the reduction in turtle takes are quite uncertain. This problem is an inhere consequence of the low take rate of turtles in the observer data. There is more uncertainty predicting rare events than there is for predicting common events. It is also difficult to predi three dimensional distributions (two in space and one in time) from a small number observations. For example, there are only 38 take observations of leatherback turtles availab upon which to estimate parameters of each month effect and latitude and longitude effects. Th uncertainty in predictions of turtle take reductions is indicated in Attachment 7, which gives 95 confidence intervals based on "bootstrapping" (a commonly-used statistical method for examini uncertainty in predictions from complex models) performed by NMFS. Attachment 7 indicate that the 95% confidence interval for closure options aimed at achieving a 50% reduction o

atherback turtle takes, is from about a 15% to a 75% reduction in takes.

m particularly concerned about the uncertainty associated with month effects estimated by AM. The NMFS analysis treated month as a categorical variable, which meant that one rameter had to be fit for each month. This is a lot of parameters considering there are data for ly 38 leatherback turtle takes. It is easy to envision that adding or subtracting a few takes in y particular month would substantially change model predictions. In fact, this is the type of certainty captured by the bootstrap estimates of confidence intervals described above. In this se, it might have been better to have used a smoothed continuous variable for the seasonal ect, rather than categorical variables for each month.

The NMFS analysis makes important assumptions about the redeployment of effort that is turbed by time/area closures. Assumptions are necessary in order to predict how many turtles ll be taken by redeployed effort, and how the closure will affect the catch of principle species the fishery and revenues. While the assumptions made by NMFS are reasonable, there are ernative assumptions that are also reasonable, which would have produced different results. r example, NMFS assumed that disturbed effort is only redeployed within fishing trip types. wever, it is likely that some effort would be redeployed into different trip types. This scenario ms particularly likely as areas that are good for swordfishing are closed (which is to be pected since observer data indicates that this trip type has a higher take rate of leatherback tles than other trip types). If effort is redeployed from swordfishing trips to tuna trips, the uction in leatherback turtle takes may be greater than predicted by the NMFS analysis. Of urse, NMFS assumptions about redeployment also affect revenues.

While predictions of revenues are probably indicative of the impact of closures on the onomics of the HLL fishery, the NMFS analysis does not address profits. Ultimately, it will be fits, not revenues, that determine the economic viability of the HLL fishery.

The NMFS analysis systematically considers 180,594 closure options, but it does not consider multiple area closures. A plot of the spatial and temporal distribution of observed takes of therback turtles (Attachment 8) suggested that multiple closures might be effective in reducing therback takes. Therefore, NMFS analyzed a select set of multiple closure options as requested the panel. The results are given in Attachment 10. These results are considered later in this cument.

ctors Considered as a Basis for Recommending Time/Area Closure Options

first consideration in making recommendations on closure options is the predicted reduction eatherback turtle takes. I emphasize leatherback turtle takes because it is generally agreed that is the most endangered of the species taken in the HLL fishery. Since the HLL fishery only ounts for a small fraction of takes by all fisheries, it is my judgement that reducing the take of therback turtles in the fishery is important in the context of all fisheries doing their share to help save leatherbacks, rather than because the HLL fishery is itself an important threat tc species. I also think that reducing the total take of turtles is important, since all the species ta by the fishery are protected under the U.S. Endangered Species Act. Since loggerhead turtles the most commonly taken species in the HLL fishery (67% of all observed takes), reducing t take should be the second consideration in making closure recommendations. Adverse imp on the fishery should also be a consideration according to the court's injunction order. Theref I attempted to balance reductions in turtle takes against reductions in revenues.

Another consideration in selecting a time/area closure is to what extent it is a temporal closur the entire fishing area or a spatial closure of part of the area (for all or part of the year). I inclined to give preference to spatial closures over temporal closures, for three reasons. Fi modeling a temporal closure requires assumptions about the redeployment of disturbed effort, t I consider more uncertain than the assumptions made for area closures. For temporal closu NMFS had to assume how much effort would be redeployed (if the temporal closure is lon cannot all be redeployed) and into which months. For an area closure, it was only necessar assume that fishing effort would be redeployed outside of the closed area with the same patt as the fishing effort that was already there. Secondly, there may be adverse impacts of tempo closures that are not captured by the NMFS analysis, such as adverse effects on mar competitiveness. Thirdly, I am particularly concerned about uncertainty in predicted leatherba takes associated with month effects in the GAM (as discussed in the previous section of t document). Therefore, I feel that an option that depends heavily on a temporal closure of t entire fishing area to reduce takes of leatherback turtles may not be a robust approach.

A key issue is how much reduction in leatherback turtle takes should be the goal of time/ar closures. The following considerations guided my judgement on this issue:

1. Status of leatherback turtles. There seems to be general agreement that leatherback turtles a critically endangered and that fishery takes are an important cause of their endangerment. T NMFS/USFWS recover plan for leatherback turtles calls incidental takes by fisheries a serio threat. The rate of decline in the number of nesting female leatherback turtles on Mexican beach implies to me that fishery takes of leatherbacks must be substantially reduced if the decline is be halted.

2. The proportion of observed turtle takes that occurred in the area of the court ordered emergenc closure. It is my understanding that the court considered the spatial distribution of observe takes of turtles in its deliberations leading to the specification of the court ordered emergenc closure. Data presented by NMFS during the meeting of the panel indicated that approximatel half of the observed turtle takes were in the area of the emergency closure (68% of loggerhead 34% of leatherbacks, 8% of olive ridleys, 0% of greens, and 52% of all species). The area of th closure contains only a small proportion of the logbook reported effort data for the HLL fisher Therefore, I presume that the court intended the closure to achieve a substantial reduction in turtl takes (around 50%) without substantially impacting the fishery.

Plateau on the leatherback turtle take reduction/revenue reduction curve (Attachment 4) at out a revenue reduction of 10%. This curve indicates that revenues are insensitive to the nount of reduction in leatherback turtle takes for take reductions ranging from about 30% to out 50%. The loss in revenues increases sharply for reductions in turtle takes much above 50%. hus the marginal cost of take reductions greater than about 50% are high, whereas the takes duction can be increased up to about 50% at a relatively low marginal cost. To substantially duce the loss in revenues, the reduction in takes would have to be cut nearly in half.

Feasibility of detecting a difference in leatherback turtle takes. For statistical reasons, it is herently difficult (i.e., requiring a large sample size) to detect a change in the frequency of a rare ents, such as taking a leatherback turtle in about 1% of longline sets. Therefore, the change in equency of the event must be relatively large for it to be feasible to detect a difference. It will obably take a sample size of observed sets larger than the annual sample size in 1994-1998, to tect a reduction in leatherback turtle takes of 50%, and it is probably unrealistic to expect to tect take reductions much smaller than 50%.

sed on the considerations above, I concluded that a key goal for time/area closures should be eduction in leatherback turtle takes of about 50%.

ecommendations on Time/Area Closures of the HLL Fishery

xamined all of the time/area closure options included in the report of the NMFS analysis. nce I set as a key goal for time/area closures a reduction in leatherback turtle takes by about %, I focused on the options given in Attachment 9 . Based on these options, and the factors I cussed in the previous section of this document, I recommend that NMFS give priority nsideration to two groups of closure options.

oup 1. Close the area north of a line within the range of 30 degrees N to 33 degrees N ring June through March, and close all areas during April and May.

e closure options in this group are indicated by "gp1" in the tables in Attachment 9. The NMFS alysis indicates that the take reduction of leatherback turtles and revenues are insensitive to the sition of the closure's southern boundary between 30 and 33 degrees N for a June-March osure. As the southern boundary of the closure is decreased from 33 degrees to 30 degrees, the imated leatherback take reduction increases from 50.7% to 55.8%, while the reduction in imated revenues increases from 9.8% to 11.4%. The take reduction of loggerhead turtles is edicted to be more sensitive to the southern boundary of the closure; it increases from 32.7% 52.7% when the boundary is decreased from 33 degrees to 30 degrees. The loss in swordfish ch is also sensitive to the southern boundary (increasing from 22.3% to 37.2%). All of these ults also included the effect of a closure of all areas for the months of April and May.

predicted revenue losses are an accurate indicator of the adverse impact of closures on the fishing industry, lowering the southern boundary of the June-March closure to 30 degrees n make sense since doing so achieves considerable additional savings of loggerhead turtles small marginal cost to the fishery. However, predicted revenue losses are only indicative of adverse economic impact. Therefore, I recommend that a southern boundary for the June-Ma closure (within the range of 30 degrees to 33 degrees) be selected after a more comprehens economic analysis.

Group 2. Close the area north of a line within the range of 28 degrees N and 30 degree during June through March, and close the area north of 23 degrees N and south of degrees N during April and May.

The closure options in this group are indicated by "gp2" in the tables in Attachment 10. T predicted savings of leatherback turtles is lower for group 2 closures than for group 1 closu (ranging from 43-45% compared to 51-56% for group 1). However, the predicted savings loggerhead turtles is higher (ranging from 55-79% compared to 33- 53% for group 1) . As w group 1 options, the savings of leatherback turtles and the loss of revenues are not very sensiti to the position of the southern boundary of the June-March closure. They range from 43-45% a 7-11%, respectively, as the boundary decreases from 30 degrees N to 28 degrees N. The ta reduction of loggerback turtles and the catch of swordfish are more sensitive (ranging from a 5 79% reduction for loggerhead turtles and 39-55% reduction for swordfish).

Group 2 closure options were not initially considered in the NMFS analysis. However, the NMI report of their analysis included no options that approached a leatherback turtle take reduction 50%, that did not require a closure of the entire HLL fishery during April and May. Since I pref a spatial closure of part of the area (for all or part of the year) to a temporal closure of the enti fishery (for the reasons given in the previous section of this document), I asked the NMFS sta to perform some additional analysis that I thought might provide options that achieve about a 50 reduction in leatherback turtle takes without closing the entire fishery. The group 2 closu options were the result of these additional analyses. They were provided to all of the pan members.

In reality, I do not think there is much information in the NMFS analysis upon which to base choice between group 1 and group 2 options. There is simply too much uncertainty. Recall th bootstrapping indicates that the 95% confidence interval on a leatherback turtle take reduction c 50% ranges from about 15% to 75%. The take reductions predicted for group 1 and 2 closu options are well within this range. The predicted impact on revenues is about the same for th two groups of options, but predicted revenues are only indicative (probably very crudely) of th economic impact of a closure. Group 2 closures may be better for protecting loggerhead turtle than group 1 closures. Note that the confidence intervals for predicted loggerhead take reduction are probably narrower than for leatherback turtles since there are a lot more observations c loggerhead takes upon which to estimate the parameters of a GAM.

xt Steps

elieve the groups of options that I recommended above are reasonable compromises between turtle conservation and economic impact on the HLL fishery, based primarily on the ormation provided by NMFS time/area closure analyses. I recommend that NMFS conduct litional analyses and obtain input from the HLL fishery before deciding between the two groups options or options within the groups. In particular, NMFS should conduct a more nprehensive analysis of the economic implications of each of the options than is contained in NMFS time/area closure analyses. NMFS described such an analysis during the meeting of panel. A more comprehensive economic analysis may indicate a different pattern of fishing ort redeployment than was assumed in the NMFS time/area closure analyses, which would ect turtle takes, as well as revenues.

ddition to conducting a more comprehensive economic analysis, there should also be an ortunity for input from the HLL fishing industry. There will always be industry preferences t are not captured by analyses. Since fishery management usually requires the cooperation of industry, industry preferences should be accommodated to the extent practical without unduly ardizing sea turtle take reductions.

he introduction of this document, I raised concerns about time/area closures as a fishery nagement approach for reducing incidental takes of sea turtles. One limitation of the approach hat its effectiveness is quite uncertain when there are relatively few observed takes on which ase the design of closures. Thus, if time area/closures are to be used, it is important to increase number of observed sets (which will presumably result in more observed takes) as a basis for roving the design of closures. In addition, fishery independent information on sea turtle ributions would be valuable for the design of closures.

r modifications and changes in fishing practices are potential alternatives to time/area closures might be effective in reducing the take of sea turtles. This approach will probably require a nbination of scientific research (e.g., on sea turtle behavior) and experimentation by the fishing ustry. The latter usually requires economic incentives. One option is to establish a sea turtle e limit, thus giving the industry an incentive to learn how to avoid taking turtles so that they continue fishing as long as possible. However, enforcing a limit on turtle takes requires 100% erver coverage, which is unrealistic. An alternative is to set a turtle take limit for vessels that nt to fish within closures and are willing to pay for observers.

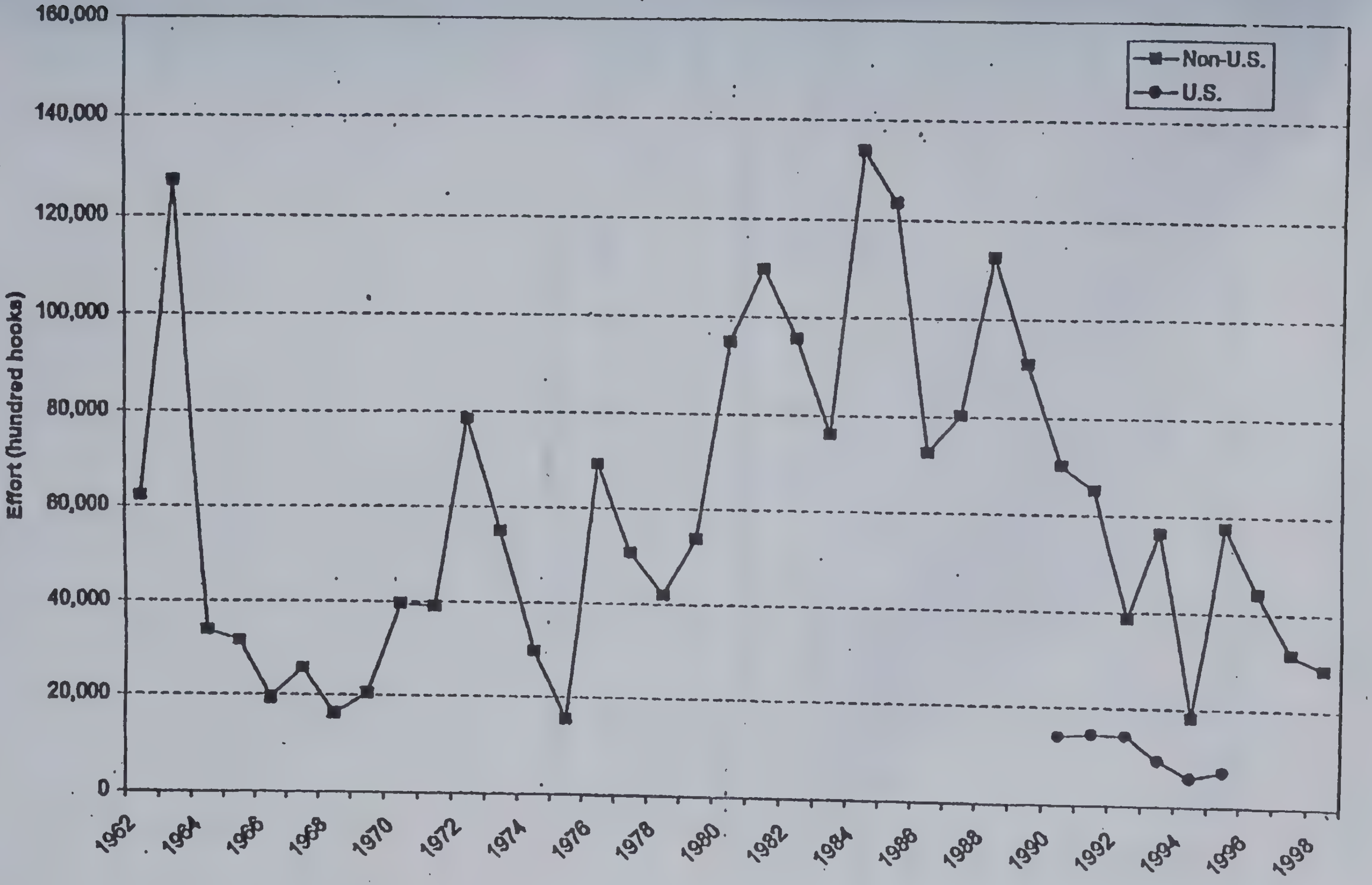
ring the meeting of the panel, it was stated several times that turtle takes, particularly herback turtles, occur primarily in trips that land swordfish. The fact that the catch of rdfish decreases more than the catch of other fish species as turtle takes are reduced (according he NMFS analysis; for example, see Attachments 9 and 10) supports these statements. sumably, shallower fishing for swordfish (relative to other species), and the use of light sticks, the factors that make sea turtles more vulnerable to longline sets that are targeting swordfish.

If there is a sound scientific basis for concluding that fishing trips that land swordfish are primary problem with respect to sea turtle takes, and that fishing trips that do not land sword take a minimal number of sea turtles, then general closures that apply to all longline fish impose unnecessary adverse impacts on the fishing industry. Alternative approaches wo considering are (a) limiting the number of fishing days that are allowed for trips that l swordfish (above a minimal level corresponding to the expected bycatch in fisheries target other species), or (b) time/area closures that only apply to fishing trips that land swordfish.

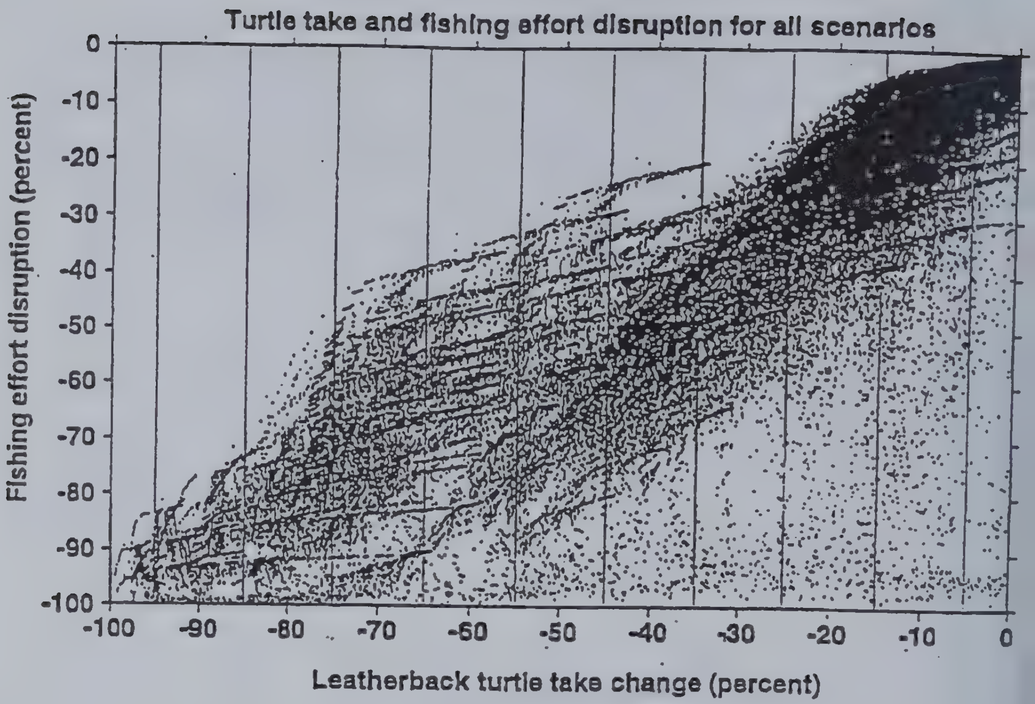
Acknowledgment

I want to compliment Donald Kobayashi and Jeff Polovina for their outstanding efforts conducting the NMFS time/area closure analysis. The clarity of their description of the analys and their responsiveness to questions during the meeting of the panel, made the panel's task a easier than it would have been otherwise. Sam Pooley also provided much valuable informati during the meeting of the panel. I enjoyed working with fellow panel members John Hampt and Larry Crowder.

ATTACHMENT 1

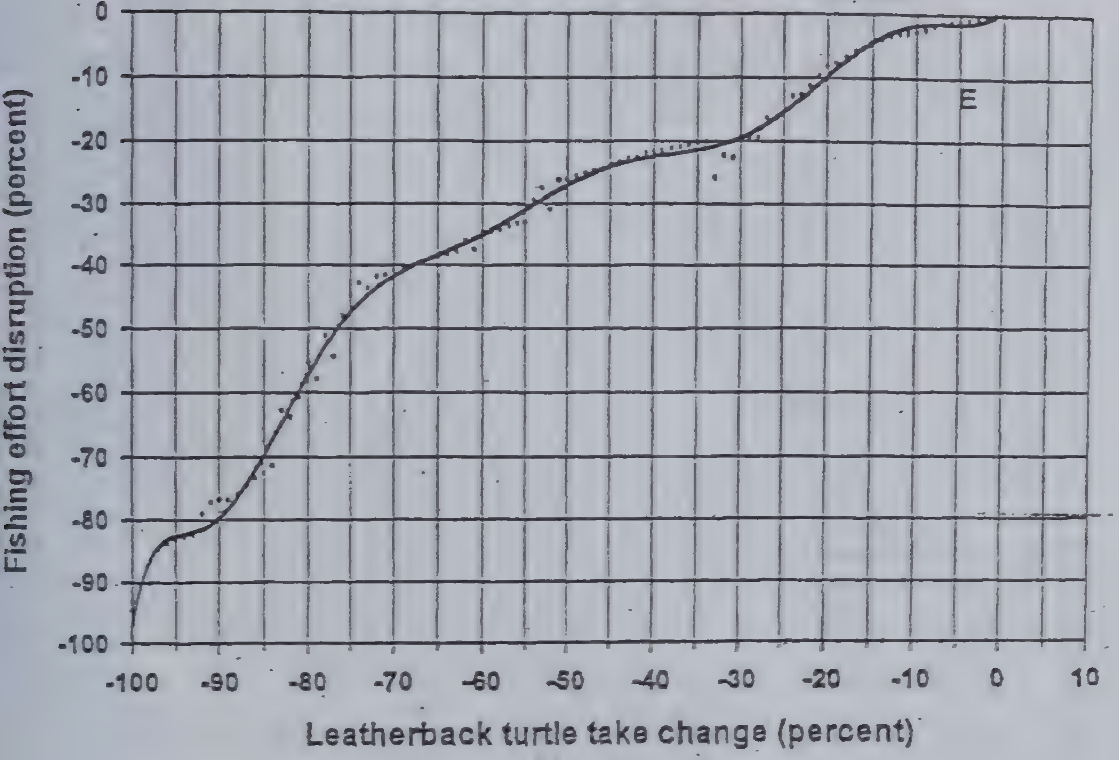


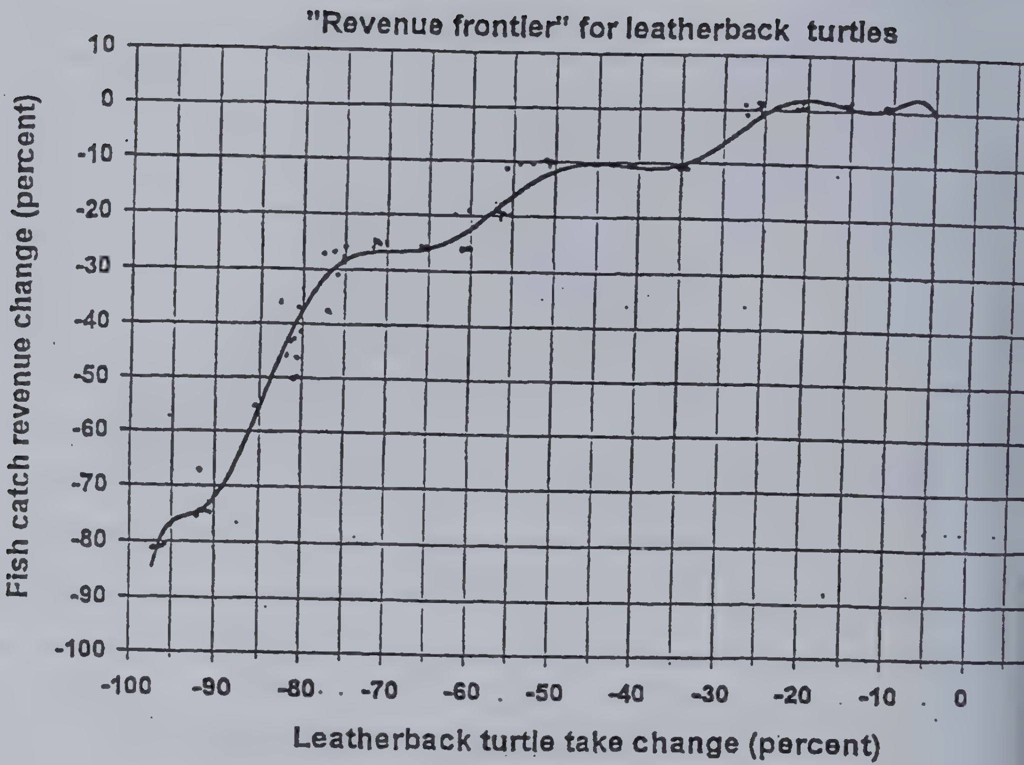
ATTACHMENT 2

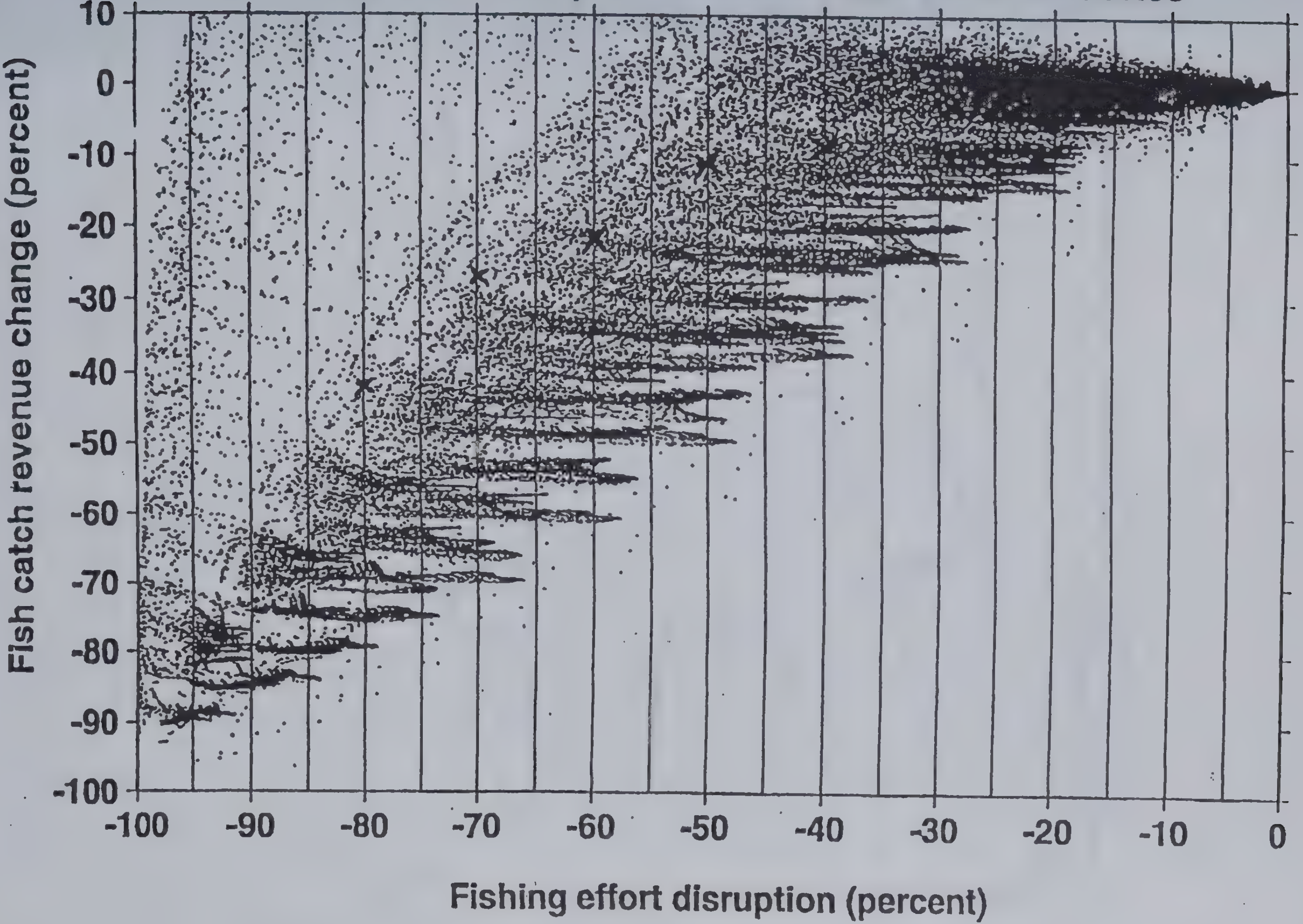


ATTACHMENT 3

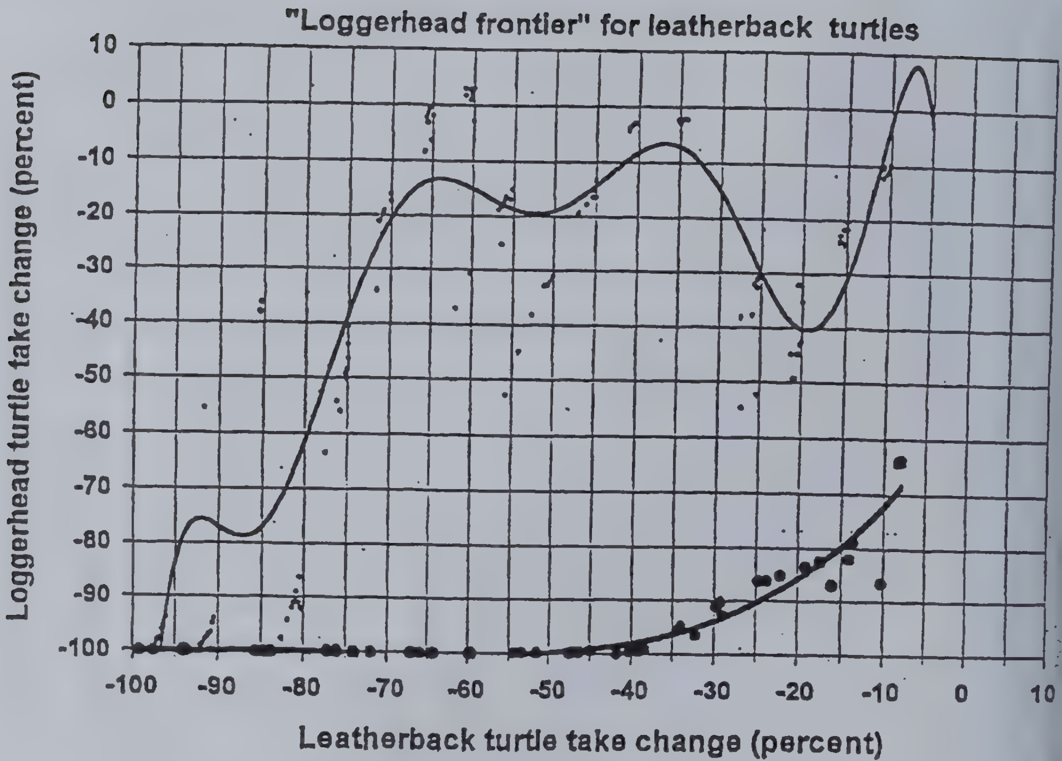
"Efficient frontier" for leatherback turtles

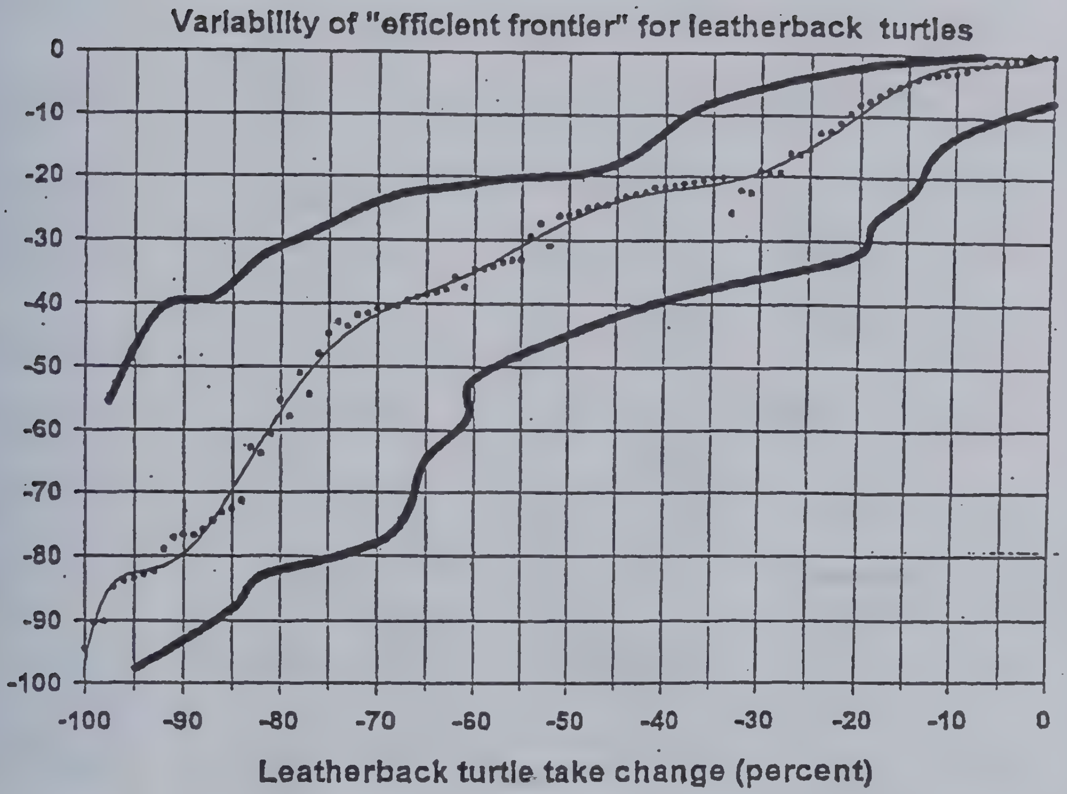



"Revenue frontier" for leatherback turtles
Fish catch revenue change (percent)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
Leatherback turtle take change (percent)



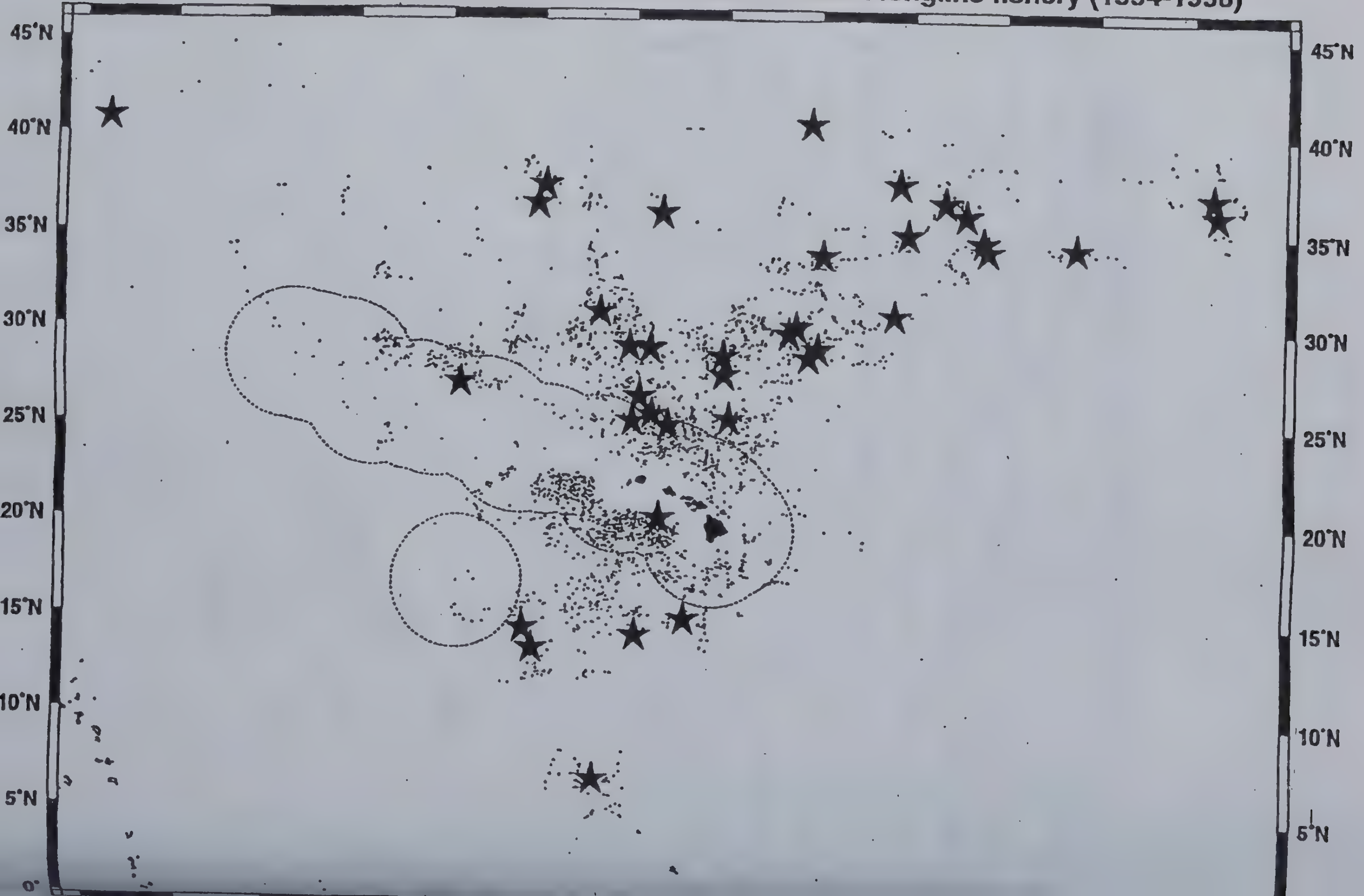
Fishing effort disruption versus revenue for all scenarios


"Loggerhead frontier" for leatherback turtles
Loggerhead turtle take change (percent)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
Leatherback turtle take change (percent)



Variability of "efficient frontier" for leatherback turtles

Observer data and leatherback turtle take in Hawaii based longline fishery (1994-1998)


45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
0°
45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N

Separated season latitude	2	4	30	-33.09%	-10.04%	-11.30%	-52.67%	-55.80%	0.46%	-3.19%	-37.60%	1.26%	-17.00%	0.78%	-21.09%	-0.75%	-5.00%
Separated season latitude	3	4	31	-33.25%	-19.00%	-20.38%	-25.10%	-56.48%	-12.36%	-23.95%	-31.47%	-6.31%	-25.00%	-10.02%	-9.62%	-10.23%	-14.90%
Separated season box	3	4	164032	-33.52%	-19.00%	-19.80%	-16.87%	-55.46%	-14.74%	-16.92%	-27.41%	-7.57%	-22.58%	-10.16%	-8.27%	-14.00%	-15.14%
Separated season box	3	4	171033	-33.53%	-19.00%	-19.21%	-18.03%	-56.06%	-13.92%	-17.24%	-27.96%	-6.80%	-24.46%	-10.20%	-8.37%	-14.04%	-15.14%
Separated season box	3	4	170033	-33.44%	-19.00%	-19.29%	-18.25%	-56.54%	-14.07%	-17.25%	-27.86%	-6.95%	-23.99%	-10.30%	-7.45%	-14.18%	-15.17%
Separated season box	3	4	169033	-33.31%	-19.00%	-19.43%	-17.28%	-56.17%	-14.21%	-17.32%	-27.55%	-7.17%	-23.75%	-10.40%	-7.37%	-14.43%	-15.20%
Separated season box	3	4	168033	-33.25%	-19.00%	-19.48%	-17.12%	-56.16%	-14.28%	-17.44%	-27.38%	-7.32%	-23.73%	-10.56%	-6.25%	-14.55%	-15.24%
Separated season box	3	4	167033	-33.20%	-19.00%	-19.57%	-16.96%	-56.09%	-14.32%	-17.62%	-27.33%	-7.45%	-23.60%	-10.65%	-6.60%	-14.74%	-15.25%
Separated season box	3	4	166033	-33.12%	-19.00%	-19.63%	-16.52%	-55.99%	-14.39%	-17.79%	-27.32%	-7.52%	-23.41%	-10.71%	-6.86%	-14.88%	-15.25%
Separated season box	3	4	165033	-32.95%	-19.00%	-19.71%	-15.08%	-55.15%	-14.50%	-18.32%	-27.08%	-7.68%	-23.03%	-10.81%	-7.51%	-15.04%	-15.27%

Leatherback turtle take reduction bin # 11 (-50% to -55%)
10 best of 3393 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Mid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	4	31	-29.46%	-10.04%	-10.46%	-44.93%	-54.20%	-1.04%	-6.03%	-29.24%	0.81%	-17.55%	-0.58%	-17.96%	-5.44%	-6.14%
Separated season latitude	2	4	32	-27.43%	-10.04%	-10.46%	-38.12%	-52.67%	-1.99%	-7.31%	-25.05%	0.09%	-17.30%	-1.40%	-13.92%	-5.25%	-6.65%
Separated season latitude	2	4	33	-26.22%	-10.04%	-10.69%	-32.72%	-50.68%	-2.57%	-7.33%	-22.34%	-1.14%	-13.96%	-2.89%	-11.10%	-5.85%	-7.00%
Separated season box	2	4	173031	-28.14%	-10.04%	-9.76%	-32.93%	-51.15%	-3.90%	2.75%	-23.75%	-0.67%	-14.93%	-1.88%	-11.62%	-8.48%	-6.36%
Separated season box	2	4	172031	-27.99%	-10.04%	-9.86%	-32.61%	-50.89%	-4.10%	2.70%	-23.39%	-0.82%	-14.64%	-2.07%	-12.83%	-9.06%	-6.64%
Separated season box	2	4	171031	-27.91%	-10.04%	-9.89%	-32.60%	-50.80%	-4.23%	2.39%	-22.79%	-0.99%	-13.81%	-2.25%	-13.23%	-9.45%	-6.75%
Separated season box	2	4	170031	-27.80%	-10.04%	-9.90%	-32.09%	-50.49%	-4.37%	2.34%	-22.31%	-1.21%	-13.32%	-2.30%	-12.39%	-9.69%	-6.81%
Separated season box	2	4	169031	-27.65%	-10.04%	-10.10%	-31.23%	-50.14%	-4.52%	2.26%	-21.82%	-1.40%	-13.05%	-2.51%	-12.14%	-10.00%	-6.87%
Separated season box	2	4	168031	-27.58%	-10.04%	-10.17%	-31.13%	-50.14%	-4.59%	2.11%	-21.59%	-1.61%	-12.96%	-2.61%	-11.26%	-10.09%	-6.92%
Separated season box	2	4	167031	-27.51%	-10.04%	-10.24%	-31.00%	-50.06%	-4.64%	1.89%	-21.36%	-1.77%	-12.80%	-2.74%	-11.67%	-10.23%	-6.96%

Leatherback turtle take reduction bin # 10 (-45% to -50%)
10 best of 3650 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Mid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	2	4	163032	-24.71%	-10.04%	-10.50%	-16.34%	-45.49%	-6.25%	-0.81%	-15.97%	-3.54%	-9.88%	-4.12%	-3.96%	-11.05%	-7.55%
Separated season box	2	4	162032	-24.35%	-10.04%	-10.66%	-13.25%	-45.05%	-6.50%	-0.99%	-14.84%	-3.91%	-8.91%	-4.39%	-4.23%	-12.25%	-7.61%
Separated season box	2	4	168033	-24.82%	-10.04%	-10.18%	-19.73%	-47.19%	-5.49%	-1.20%	-16.92%	-2.91%	-11.91%	-4.27%	-4.27%	-11.22%	-7.54%
Separated season box	2	4	167033	-24.76%	-10.04%	-10.27%	-19.57%	-47.12%	-5.54%	-1.38%	-16.88%	-3.03%	-11.79%	-4.36%	-4.63%	-11.42%	-7.55%
Separated season box	2	4	166033	-24.69%	-10.04%	-10.33%	-19.18%	-47.03%	-5.60%	-1.56%	-16.87%	-3.11%	-11.60%	-4.41%	-4.88%	-11.52%	-7.55%
Separated season box	2	4	165033	-24.52%	-10.04%	-10.40%	-17.75%	-46.20%	-5.75%	-2.08%	-16.63%	-3.27%	-11.22%	-4.51%	-5.53%	-11.72%	-7.58%
Separated season box	2	4	164033	-24.21%	-10.04%	-10.50%	-15.27%	-45.18%	-5.99%	-2.24%	-15.54%	-3.52%	-10.14%	-4.68%	-3.96%	-11.85%	-7.66%
Separated season box	2	4	173034	-24.11%	-10.04%	-10.20%	-16.59%	-45.30%	-5.56%	-2.25%	-16.60%	-3.07%	-12.63%	-4.77%	-1.57%	-10.99%	-7.55%
Separated season box	2	4	172034	-24.00%	-10.04%	-10.26%	-16.40%	-45.09%	-5.72%	-2.33%	-16.57%	-3.13%	-12.33%	-4.81%	-2.63%	-11.20%	-7.56%
Separated season box	2	4	171034	-23.93%	-10.04%	-10.25%	-16.39%	-45.01%	-5.82%	-2.59%	-16.30%	-3.21%	-11.91%	-4.85%	-2.94%	-11.27%	-7.58%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
10 best of 4035 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Mid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	2	4	160034	-22.15%	-10.04%	-10.68%	-4.19%	-41.19%	-7.04%	-4.09%	-12.63%	-4.83%	-7.72%	-5.69%	-1.35%	-13.20%	-7.85%
Separated season box	2	4	159034	-22.10%	-10.04%	-10.71%	-3.76%	-41.07%	-7.07%	-4.15%	-12.56%	-4.89%	-7.73%	-5.74%	-1.60%	-13.30%	-7.87%
Separated season box	2	4	158034	-22.01%	-10.04%	-10.75%	-3.42%	-40.77%	-7.14%	-4.24%	-12.53%	-4.94%	-7.69%	-5.78%	-1.58%	-13.37%	-7.87%
Separated season box	2	4	157034	-21.93%	-10.04%	-10.78%	-3.05%	-40.61%	-7.17%	-4.31%	-12.50%	-4.97%	-7.66%	-5.81%	-1.57%	-13.37%	-7.88%
Separated season box	2	4	156034	-21.90%	-10.04%	-10.79%	-2.93%	-40.57%	-7.20%	-4.32%	-12.47%	-5.00%	-7.66%	-5.83%	-1.42%	-13.44%	-7.88%
Separated season box	2	4	155034	-21.90%	-10.04%	-10.79%	-2.94%	-40.56%	-7.20%	-4.33%	-12.48%	-5.01%	-7.56%	-5.85%	-1.45%	-13.46%	-7.88%
Separated season box	2	4	154034	-21.89%	-10.04%	-10.80%	-2.95%	-40.54%	-7.20%	-4.35%	-12.49%	-5.02%	-7.55%	-5.85%	-1.46%	-13.46%	-7.88%
Separated season box	2	4	153034	-21.88%	-10.04%	-10.81%	-2.95%	-40.51%	-7.21%	-4.35%	-12.49%	-5.03%	-7.49%	-5.86%	-1.41%	-13.45%	-7.89%
Separated season box	2	4	152034	-21.83%	-10.04%	-10.82%	-2.98%	-40.35%	-7.22%	-4.39%	-12.39%	-5.07%	-7.52%	-5.88%	-1.23%	-13.47%	-7.89%
Separated season box	2	4	151034	-21.81%	-10.04%	-10.84%	-2.98%	-40.29%	-7.23%	-4.41%	-12.34%	-5.11%	-7.56%	-5.92%	-0.32%	-13.57%	-7.90%

ATTACHMENT 10

Combined merged spatial closures. "1" and "2" refer to static vs. dynamic, resp. Other abbreviations similar to appendix 1, e.g., "RE"=revenue.

Closure for ten months of June through March inclusive, "North of...".

LAT	FED	FEL	LO1	(LO2)	LE1	LE2)	RI1	RI2	GR1	GR2	SW1	SW2	BI1	BI2	AL1	AL2	YE1	YE2	BL1	BL2	RE1	RE2
31	-9%	0%	-53%	-36%	-25%	-20%	-2%	5%	-12%	-2%	-25%	-16%	-3%	6%	-15%	-10%	-2%	5%	-21%	-16%	-11%	-1%
32	-7%	0%	-43%	-30%	-24%	-18%	-2%	5%	-10%	-2%	-20%	-12%	-2%	6%	-13%	-8%	-1%	4%	-17%	-11%	-8%	0%
30	-13%	0%	-68%	-46%	-28%	-22%	-4%	7%	-18%	-1%	-35%	-21%	-6%	7%	-18%	-10%	-5%	7%	-27%	-20%	-17%	-2%
29	-17%	0%	-80%	-58%	-30%	-23%	-6%	8%	-22%	0%	-44%	-26%	-8%	8%	-20%	-10%	-7%	9%	-30%	-25%	-22%	-3%
28	-19%	0%	-85%	-70%	-32%	-24%	-7%	9%	-27%	-9%	-51%	-35%	-11%	8%	-22%	-11%	-10%	10%	-31%	-24%	-26%	-6%

Closure for two months of April and May, "North of... and South of...".

24/15	-13%	0%	-9%	-8%	-31%	-13%	-10%	1%	-14%	-6%	-23%	-13%	-7%	-1%	-5%	4%	-12%	-6%	-3%	-1%	-14%	-4%
25/15	-11%	0%	-9%	-8%	-28%	-12%	-9%	1%	-13%	-4%	-20%	-10%	-6%	-1%	-5%	3%	-11%	-6%	-3%	-1%	-12%	-2%
23/15	-14%	0%	-9%	-9%	-33%	-21%	-11%	-2%	-15%	-7%	-24%	-18%	-8%	-1%	-5%	6%	-12%	-6%	-3%	-2%	-15%	-5%
24/16	-13%	0%	-9%	-8%	-32%	-12%	-10%	1%	-15%	-8%	-23%	-13%	-8%	-1%	-6%	5%	-12%	-6%	-3%	-1%	-14%	-4%
24/14	-12%	0%	-9%	-8%	-30%	-12%	-9%	1%	-14%	-8%	-23%	-13%	-8%	0%	-4%	3%	-12%	-6%	-2%	-1%	-13%	-4%
25/14	-11%	0%	-9%	-8%	-28%	-12%	-8%	1%	-13%	-5%	-20%	-10%	-5%	0%	-4%	3%	-11%	-6%	-2%	-1%	-12%	-2%
23/16	-14%	0%	-9%	-9%	-33%	-21%	-11%	-2%	-15%	-7%	-24%	-18%	-8%	-2%	-6%	5%	-13%	-6%	-3%	-1%	-15%	-5%

Additive results.

31/24/15	-22%	0%	-62%	-44%	-56%	-33%	-12%	6%	-20%	-8%	-48%	-29%	-10%	5%	-20%	-6%	-14%	-1%	-24%	-17%	-25%	-5%
31/25/15	-20%	0%	-62%	-44%	-53%	-32%	-11%	6%	-25%	-6%	-45%	-26%	-9%	5%	-20%	-7%	-13%	-1%	-24%	-17%	-23%	-3%
31/23/15	-23%	0%	-62%	-45%	-58%	-41%	-13%	3%	-27%	-9%	-49%	-34%	-11%	5%	-20%	-5%	-14%	-1%	-24%	-17%	-26%	-8%
31/24/16	-22%	0%	-62%	-44%	-57%	-32%	-12%	6%	-27%	-8%	-48%	-29%	-11%	5%	-21%	-5%	-14%	-1%	-24%	-18%	-25%	-5%
31/24/14	-21%	0%	-62%	-44%	-55%	-32%	-11%	6%	-20%	-8%	-48%	-29%	-9%	6%	-19%	-7%	-14%	-1%	-23%	-17%	-24%	-5%
31/25/14	-20%	0%	-62%	-44%	-53%	-32%	-10%	6%	-25%	-7%	-45%	-26%	-8%	6%	-19%	-7%	-13%	-1%	-23%	-17%	-23%	-3%
31/23/16	-23%	0%	-62%	-45%	-58%	-41%	-13%	3%	-27%	-9%	-49%	-34%	-11%	4%	-21%	-5%	-15%	-1%	-24%	-17%	-26%	-6%
32/24/15	-20%	0%	-52%	-38%	-55%	-31%	-12%	6%	-24%	-8%	-43%	-25%	-9%	4%	-18%	-4%	-13%	-2%	-20%	-12%	-22%	-4%
32/25/15	-18%	0%	-52%	-38%	-52%	-30%	-11%	6%	-23%	-6%	-40%	-22%	-8%	4%	-18%	-5%	-12%	-2%	-20%	-12%	-20%	-2%
32/23/15	-21%	0%	-52%	-39%	-57%	-39%	-13%	3%	-25%	-8%	-44%	-30%	-10%	4%	-18%	-3%	-13%	-2%	-20%	-13%	-23%	-5%
32/24/16	-20%	0%	-52%	-38%	-56%	-30%	-12%	6%	-25%	-8%	-43%	-25%	-10%	4%	-19%	-3%	-13%	-2%	-20%	-12%	-22%	-4%
32/24/14	-19%	0%	-52%	-38%	-54%	-30%	-11%	6%	-24%	-8%	-43%	-25%	-8%	5%	-17%	-5%	-13%	-2%	-19%	-12%	-21%	-4%
32/25/14	-18%	0%	-52%	-38%	-52%	-30%	-10%	6%	-23%	-7%	-40%	-22%	-7%	5%	-17%	-5%	-12%	-2%	-18%	-12%	-20%	-2%
32/23/16	-21%	0%	-52%	-38%	-57%	-39%	-13%	3%	-25%	-9%	-44%	-30%	-10%	3%	-19%	-3%	-14%	-2%	-20%	-12%	-23%	-5%
30/24/15	-26%	0%	-77%	-54%	-59%	-35%	-14%	8%	-30%	-7%	-58%	-34%	-13%	6%	-23%	-6%	-17%	1%	-30%	-21%	-31%	-6%
30/25/15	-24%	0%	-77%	-54%	-56%	-34%	-13%	8%	-29%	-6%	-55%	-31%	-12%	6%	-23%	-7%	-16%	1%	-30%	-21%	-29%	-4%
30/23/15	-27%	0%	-77%	-55%	-61%	-43%	-15%	5%	-31%	-8%	-59%	-39%	-14%	6%	-23%	-5%	-17%	1%	-30%	-22%	-32%	-7%
30/24/16	-26%	0%	-77%	-54%	-60%	-34%	-14%	8%	-31%	-7%	-58%	-34%	-14%	8%	-24%	-5%	-17%	1%	-30%	-21%	-31%	-6%
30/24/14	-25%	0%	-77%	-54%	-58%	-34%	-13%	8%	-30%	-7%	-58%	-34%	-12%	7%	-22%	-7%	-17%	1%	-29%	-21%	-30%	-6%
30/25/14	-24%	0%	-77%	-54%	-56%	-34%	-12%	8%	-29%	-6%	-55%	-31%	-11%	7%	-22%	-7%	-16%	1%	-29%	-21%	-29%	-4%
SP2 30/23/16	-27%	0%	-77%	-55%	-61%	-43%	-15%	5%	-31%	-8%	-59%	-39%	-14%	5%	-24%	-5%	-18%	1%	-30%	-21%	-32%	-7%
29/24/15	-30%	0%	-89%	-66%	-61%	-36%	-16%	9%	-36%	-6%	-67%	-39%	-15%	7%	-25%	-6%	-19%	3%	-33%	-26%	-36%	-7%
29/25/15	-28%	0%	-89%	-66%	-58%	-35%	-15%	8%	-35%	-4%	-64%	-36%	-14%	7%	-25%	-7%	-18%	3%	-33%	-28%	-34%	-5%
29/23/15	-31%	0%	-89%	-67%	-63%	-44%	-17%	8%	-37%	-7%	-68%	-44%	-16%	7%	-25%	-5%	-18%	3%	-33%	-27%	-37%	-8%
29/24/16	-30%	0%	-89%	-66%	-62%	-35%	-16%	9%	-37%	-6%	-67%	-39%	-16%	7%	-26%	-6%	-19%	3%	-33%	-26%	-36%	-7%
29/24/14	-29%	0%	-88%	-66%	-60%	-35%	-15%	9%	-36%	-6%	-67%	-39%	-14%	8%	-24%	-7%	-19%	3%	-32%	-26%	-35%	-7%
29/25/14	-28%	0%	-89%	-66%	-58%	-35%	-14%	9%	-35%	-5%	-64%	-36%	-13%	8%	-24%	-7%	-18%	3%	-32%	-26%	-34%	-5%
SP2 29/23/16	-31%	0%	-89%	-67%	-63%	-44%	-17%	8%	-37%	-7%	-68%	-44%	-16%	6%	-26%	-5%	-20%	3%	-33%	-26%	-37%	-8%
28/24/15	-32%	0%	-94%	-78%	-83%	-37%	-17%	10%	-41%	-15%	-74%	-48%	-18%	7%	-27%	-7%	-22%	4%	-34%	-25%	-40%	-10%
28/25/15	-30%	0%	-94%	-78%	-60%	-36%	-16%	10%	-40%	-13%	-71%	-45%	-17%	7%	-27%	-8%	-21%	4%	-34%	-25%	-38%	-8%
28/23/15	-33%	0%	-94%	-79%	-85%	-45%	-18%	7%	-42%	-16%	-75%	-53%	-19%	7%	-27%	-6%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28/24/16	-32%	0%	-94%	-78%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

APPENDIX G

Estimation of Sea Turtle Take and Mortality in the Hawaiian Longline Fisheries, August 2000.

Southwest Fisheries Science Center
Administrative Report H-00-06

ESTIMATION OF SEA TURTLE TAKE AND MORTALITY IN THE HAWAIIAN LONGLINE FISHERIES

Marti L. McCracken

Honolulu Laboratory
Southwest Fisheries Science Center
National Marine Fisheries Service, NOAA
2570 Dole Street, Honolulu, Hawaii 96822-2396

August 2000

NOT FOR PUBLICATION

1. INTRODUCTION

objective of this report is to explain the statistical methodology used to estimate urtle take and mortality for the Hawaiian longline fishery. Our target population, the tion about which information is wanted, consists of all trips by the Hawaiian longline es recorded in their logbooks. Although turtle takes are recorded in the logbooks, this ation is considered unreliable. On the basis of biological opinions issued under the gered Species Act (ESA), an observer program was established in 1994. The observer m places trained observers on randomly selected trips of the Hawaiian longline fishery. se a list of trips does not exist until the end of the year, trips are sampled such that mple population, the population from which samples are drawn, coincides with the population as closely as possible. During observed trips, the number of turtle takes cies, the condition of the turtles, other species of concern, and possible explanatory les are recorded by the observer for each longline set. A turtle take is defined as eraction between a turtle and the fishing vessel or gear, and usually implies that the became entangled in the line or was caught on a hook. In this report, the observer gbook records from 1994 through 1999 were used to estimate total turtle take and ity by species by year. Since sampling did not begin until late February 1994, we olated from our sampled population to predict take for the first couple of months in

lel-based predictors, instead of sample-based estimators, have been used to estimate urtle takes by species since 1996. Whereas sample-based estimators assume sampling bilities to raise observed total takes to the fleet level, model-based predictors assume istical model of turtle takes. Sample-based estimators have the advantage of being lly free of assumptions concerning the structure of the target population and the char-tics being estimated, but they are typically less efficient than model-based predictors. se less than 5% of trips are sampled a year, model-based predictors have been used mate total take with the objective of gaining precision while maintaining acceptable cy.

paper presents the methods used for modeling and prediction and discusses the . The next section describes the data structure, and the methodology used for devel- the prediction model is explained in Section 3. Section 4 describes how total takes ortalities were estimated and prediction intervals approximated. The final prediction and estimated total takes and mortalities are presented in Section 5.

2. DATA STRUCTURE

a from the observer program are hierarchical, with trip as our independent observa- unit and sets within a trip defined as subunits. Because of this structure, two types chastic dependence among sets from the same trip may exist. (1) Takes from sets a trip may be more closely related than takes across trips. (2) Takes from sets close er in time and space within a trip may be more closely related. If take is modeled trip level, we could assume independent observations, but information is lost in the atory variables. For example, latitude and longitude are recorded for each set and would need to be summarized if modeling at the trip level. Hence, modeling at the el is preferred, but results can be misleading if the hierarchical structure of the data red. Therefore, if explanatory variables do not explain the dependence among sets, the dependence should be modeled. Trips by the same vessel may also be dependent, b without sufficient replication of vessels, we lack the information to model this dependenc

The 10 takes of green turtles observed during 1994-99 came from different trips; th there was no evidence within the data that a green turtle take in one set implies a high probability of a green turtle take in another set from the same trip. Only four trips h more than one set where positive leatherback takes were observed, and only three trips h more than one set where positive olive ridley takes were observed. Out of 279 observed trip 245 trips had zero leatherback takes and 254 trips had zero olive ridley takes; hence, the was little information or evidence in the data concerning dependency, if it exists. Instead assuming a dependence structure that could not be checked, sets were treated as independe but model diagnostics were used extensively to verify results.

For loggerheads turtles, 224 trips had zero observed takes, but out of the 55 trips wi positive takes, 29 had positive takes in more than one set. If this dependence structu could be successfully modeled parametrically, we would expect a better predictive mod but further work is needed to determine if there is an 'appropriate' model. Therefor loggerhead takes were modeled at the set level, but nonparametric resampling was used t model the dependence structure when estimating uncertainty.

Prediction models for turtle takes were constructed using observer data and correspondin logbook data. The response variable was the take recorded by the observer at the set leve This type of data is frequently referred to as count data; i.e., we counted the number times an event, turtle take, occurred. Turtle take is a discrete variable, typically 0, 2, or 3, with the event of a take being rare. Figures 1-4 show approximate positions observed sets with positive takes represented by red circles. For all four species, the se level data contained a very high percentage of zero takes: 99.7% for green turtles, 98.8 for leatherbacks, 99.1% for olive ridleys, and 96.2% for loggerheads. If the average cou is sufficiently large so that counts, or a transformation of them, are approximately norma robust modeling methods based on the normal distribution can be used. These method are generally more straightforward theoretically. For average counts significantly below ten results can be misleading if normality is assumed. Our average take per set was less tha one and there was a high frequency of zeros; therefore, the distribution of takes should b treated as discrete.

Furthermore, since the take rate over the levels of our explanatory variables is commonly less than one, the calculation of degrees of freedom (d.f.) needs to be adjusted to reflect the effective degrees of freedom (McCullagh and Nelder, 1989) when relying on maximum likelihood asymptotic distributions for model fitting, hypothesis testing, and interval estimation. Degrees of freedom in this case refers to the parameter in the Student's t distribution, the asymptotic distribution of our maximum likelihood estimate. Degrees of freedom is usually calculated as the number of independent observations n minus the number of parameters being estimated p, but when an event is rare, this value is misleading and needs to be modified to improve the correspondence between the distribution of the test statistic and the asymptotic distribution. Assuming a Poisson distribution with constant mean, the effective degrees of freedom is given by $f = (n - p)/(1 + .5\bar{\gamma}_2)$, where $\bar{\gamma}_2$ is the standardized fourth cumulant. Approximate confidence limits and hypothesis tests for maximum likelihood estimates should be based on the t_f distribution not t_{n-p}. To illustrate this concept, the effective

s of freedom for a sample of 1000 independent observations assuming a Poisson dis-
on with a constant rate of take is given in Figure 5. Because of the structure of the
eing analyzed, we do not have a good estimate of effective degrees of freedom.

3. DEVELOPING MODELS FOR TURTLE TAKE

en developing a prediction model, only explanatory variables well represented in log-
were considered. Table 1 lists the variables that were considered. Basically we want to
e simplest possible model that will estimate takes accurately and precisely. This means
ng a balance between including as few regressors as possible, so as to end up with the
st working model and to control the variance of the predictions; and including as many
sors as possible, so as not to miss anything, to gain the best predictive power, and to
bias. Classification trees, generalized additive models (GAM), and generalized linear
s (GLM) were used as exploratory tools in developing the final predictive models.

ny of the explanatory variables considered were related to each other, and if one of
variables was included in the model, including the other variables was redundant. To
stand the relationships between explanatory variables, they were considered individu-
n groups of related variables, and in subsets that showed possibilities for prediction.
oup of variables was associated with take, but there was dependency among them,
l consideration was taken not to be redundant and to select the best predictors. If a
of these were not clearly superior but all were comparable, the decision was based
minimizing measurement error, (2) the distribution of each variable around its mean
prediction error will increase as we move away from the average predictor values, and
e degree that the range of the logbook variable was covered in the observed sets since
polation is often less reliable than interpolation.

ause the units of measurement of different quantitative variables varied considerably,
antitative variables were scaled according to the equation

$$x_i' = \frac{2x_i - max(\mathbf{x}) - min(\mathbf{x})}{max(\mathbf{x}) - min(\mathbf{x})},$$

x_i represents the i^{th} observation of variable x and $\mathbf{x}$ represents the vector of observed
for x. This transformation should also improve the fit of the GAMs since the reliability
GAM fit is always reduced at the endpoints of the range of the predictor (Hastie and
rani 1990), and the transformation will bring in the tails of the distribution.

lassification trees. Classification trees were used to explore variables associated
ake and help determine possible categorical splits for continuous variables and pooling
egories for categorical variables. For example, for loggerhead takes, the classification
uggested transforming the continuous variable sea surface temperature (*sst*) into a
rical variable with two categories, $sst < 23.77°C$ and $sst \geq 23.77°C$. Additionally,
ees suggested that months, numbered 1-12, be grouped into three categories: (1,2),
and (3,4,7-12).

ssification trees split the sample space based on the multinomial distribution. Turtle
are not multinomial, but if the response variable is defined as 'take' and 'no take,'
ve a binomial response, a special case of the multinomial distribution. Since the vast
ty of observed takes were 0 or 1, little information was lost in using classification trees
e ability to detect associations was increased.

The tree functions in S-PLUS (Statistical Sciences, Inc., 1993) were used to grow a prune trees, see Venables and Ripley (1999) for details. At each step, the next split of tree was chosen to gain the maximal amount of reduction in the deviance, a function of t conditional likelihood. A tree continued to grow until the number of cases reaching each le was small, $n_i < 10$, or further splits did not reduce the deviance significantly. The full tr overfitted the data, thus it was necessary to reduce the number of splits so that the tr described the important features of the data. To prune the tree, cross-validation was us to suggest the level of pruning. The basic idea of cross-validation was to divide the origin data into ten mutually exclusive subsets. For each subset, a tree was grown using the da in the remaining subsets and pruned to various sizes. Each tree's fit was evaluated using t removed subset. The level of pruning was determined by comparing the average devianc measured at various tree sizes.

The cross-validation algorithm treated set as the independent unit, not trip. Becaus there was little evidence that sets within the same trip were correlated, we would not expe much of a difference in the results, but as a safety measure, trees were pruned to a range sizes near the size suggested by cross-validation. Variables and subsets of variables that th classification trees suggested were associated with take were recorded and explored furthe using generalized additive models.

One of the major benefits of using trees for prediction is that explanatory variables wit missing values can easily be included. If one of the variables with a reasonable number missing values in the logbooks had appeared to be superior as a predictor, using trees fo predicting total takes would have been given further consideration. This was not the case.

3.2. **Generalized Linear Models.** The splits of the continuous variables suggested by th trees were unsmooth predictors. For example, if one drew the probability of a loggerhead tak for the two categories of *sst* suggested by the classification tree with sea surface temperatur on the x-axis and the probability on the y-axis, there would be a break in the line a $sst = 23.77°C$. The next step was to investigate smooth forms of predictors using GLMs and GAMs and compare these to the unsmooth predictors.

A natural distribution to assume for counts of rare events is the Poisson distribution. For Poisson counts, the generalized linear model known as the log-linear model is applicable. The log-linear Poisson model assumes that all counts are independent and is formulated by assuming that the count Y_i is a Poisson random variable with mean μ_i and observed value $y_i = \mu_i + \epsilon_i$, where ϵ_i is the residual or 'error'. The mean is modeled as

$$log(\mu_i) = \beta_0 + \sum_{j=1}^{p} \beta_j x_{ij},$$

where $(x_{i1}, \dots, x_{ip})$ are the explanatory variables and the βs are (usually) unknown parameters to be estimated. The right side of the equation is referred to as the linear predictor. The function that connects the linear predictor to the mean μ of Y, in this case the log function, is known as the link function. Typically maximum likelihood estimates (MLE) are used as parameter estimates and these are derived using iterative weighted least squares or the Newton-Raphson method.

Unlike the normal distribution that is completely determined by its two parameters, the mean μ and the variance σ^2, the relationship between the mean and the variance for a Poisson variate is a fixed relationship. Given a Poisson distribution with parameter λ, this onship is $\mu = \sigma^2 = \lambda$. Hence, determining the mean of the distribution implicitly mines its variance and there is no flexibility. This is in contrast to regression models e the response is assumed normally distributed and the variance parameter and mean be estimated separately; thus, any constant degree of variability about the mean is nmodated in the fitted model. For these reasons, a Poisson distribution may seem ble for a response, but when we inspect the model, the variance does not appear to equal nean as assumed. If the variance is larger, we say that the data exhibit overdispersion; s smaller, we say the data exhibit underdispersion. Overdispersion is the more common ypically arises as a result of some sort of clustering or clumping process. With animals ts, we would expect the data to exhibit overdispersion if the animals tended to aggregate underdispersion if the animals were territorial and spread very evenly over their range. her situation where data will exhibit overdispersion is when subunits within a primary are correlated but primary units are independent. Failure to acknowledge overdispersion ead to serious underestimation of standard errors and hence to misleading inferences t the form of the linear predictor. Because we are modeling at the set level, but our pendent unit is the trip, it is important to consider overdispersion.

rious methods could be adopted for dealing with the problem, but one straightforward oach is quasi-likelihood estimation. Quasi-likelihood assumes a functional relationship een the mean and the variance; that is, it assumes that the variance has the form $Y) = V(\mu)$ for some chosen function V. One commonly assumed form for Poisson is $Var(Y) = \phi\mu$, where $\phi > 1$ represents overdispersion and $\phi < 1$ underdispersion. relatively substantial errors in the assumed functional form of $Var(Y)$ generally have a small effect on the conclusion (McCullagh and Nelder, 1989). An advantage of quasi-hood estimation is that point estimates do not depend on the value of σ^2. Using quasi-hood methods, ϕ cancels out in our estimating equations, so that regression parameters in the same as if ϕ were equal to 1. The parameter ϕ is typically called the dispersion meter, and an estimate of ϕ can be used in estimating the standard errors for the $\hat{\beta}$s. ever, quasi-likelihood estimators are not maximum likelihood estimators without the ional assumption that the responses are Poisson distributed. Nevertheless, McCullagh 3) showed they have similar properties as MLE. Under quite general conditions, they onsistent and asymptotically normal. When quasi-likelihood estimators are not MLE, (1983) and Firth (1987) showed that they still retain relatively high efficiency as long as legree of overdispersion is moderate. However, for the estimation of ϕ, quasi-likelihood not behave like a log-likelihood.

r Poisson data, a conventional estimate of ϕ is

$$\hat{\phi} = \frac{1}{n-p}\sum_i \frac{(y_i - \mu_i)^2}{\mu_i} = \frac{X^2}{(n-p)},$$

e X^2 is the generalized Pearson statistic. However, for the turtle data this estimator unsatisfactory because of the number of μ_i very near 0. For example, there have been bserved loggerhead takes south of 22°N; all 1,263 sets observed below this latitude had takes. One could argue that the probability of a positive take was zero, and thus the ber of takes observed in a set was not a Poisson variate but a fixed number, or that the ability was very small and the sample size was too small to expect a positive observed Because all observations are zero, the data provides us with no measure of variance, f these numbers were included when modeling, the estimated dispersion parameter is

0.666. However, if these values were excluded, the estimated dispersion parameter is 1.01 and this still may be underestimating the dispersion. Although loggerhead takes provide th most dramatic example, the point estimates for ϕ showed similar problems for all specie Therefore, this estimate was not used for the dispersion parameter.

Also because several $\mu_i < 1$, the effective degrees of freedom were reduced. Thus, asymptotic distributions frequently assumed for MLE could not be automatically assumed. Th affects interval estimation and sequential model fitting procedures when the methodolog depends on the asymptotic distribution of MLE.

3.3. **Generalized additive models.** GAMs are a flexible extension of GLMs. Wherea GLMs restrict the parameters relating the regressors to the response to be of linear form GAMs allow any shape ranging from a straight line to nonparametric curves of increasin complexity. Basically GAMs replace the GLM linear predictor, $\eta = \sum_{j=1}^{p} \beta_j x_j$, with a flexib additive function $\eta = \sum_{j=1}^{p} s_j(x_j, d_j)$, where $s_j(x_j)$ is an unspecified smooth function of and d_j is the degrees of freedom of the smoother. GAMs still assume additivity of the effect of the x_js on the linear predictor scale, but allow the effect of x_j to follow any smooth curve Categorical variables are permitted in GAMs and are expressed in the same manner as the are in GLMs. Similar to GLMs, the model specification is completed by a variance function $Var(Y) = V(\mu)$. An advantage of GAMs is that they can be used to compare nonlinea smooth, linear smooth, and nonsmooth predictors.

The GAM is fitted by estimating the smoothing functions, the s_js, just as GLM is fitte by estimating the parameters, the β_js; however, GAM estimates are not maximum likelihoo estimates and have not been shown to have their properties. Before the function s can b estimated, the required level of smoothing must be specified. The level of smoothing i determined by the value of the smoothing parameter what is commonly determined by th degrees of freedom specified for the smoother. The minimal amount of smoothing is just straight line $s(x) = \beta x$ and the maximal is when $s(x)$ fits the data perfectly; the smoothe goes through all points by allowing a separate gradient for each successive pair of points At these two extremes, the GAM is equivalent to the GLM since it is possible to specify in parametric form. Between these extremes, the function s is usually not specified but i estimated nonparametrically from the data by means of a scatterplot smoother. The shape o the function is therefore determined by the data rather than being restricted to a parametri form. As the degrees of freedom is increased, the function s gains flexibility and become 'rougher,' displaying more hills and valleys and more complex shapes. As with any mode building, we want the simplest possible model that will achieve our required purpose. In th context of GAMS, we want the fewest degrees of freedom in the smoothers that will achiev our modeling objectives.

Several options are available for the scatterplot smoother. Smoothing splines fit the dat using piecewise cubic polynomials. Models are fitted by satisfying a penalized least square criterion. Compared to another common smoother, locally weighted regression (loess), th theoretical and numerical behavior of smoothing splines are cleaner. When modeling turtle take there was little difference between the fits when using the different smoothers s smoothing splines were used.

3.4. **Fitting and selecting the models.** All models in this analysis were fitted using th statistical software S-PLUS (Statistical Sciences, Inc., 1993). For GLMs and GAMs, a log link and quasi-likelihood estimation were specified. Within the GAM framework and for each tinuous explanatory variable, expressing the relationship between take and the variable parametric curve (straight line or a polynomial of degree two) or a nonparametric curve compared. If the classification tree suggested transforming the continuous variable into ategorical variable, this transformation was compared to the smooth curves.

o develop a subset of plausible linear predictors, stepwise selection based on the gener- ed information criterion was used. The generalized information criterion in this context efined as

$$GIC = D - \alpha p\hat{\phi},$$

ere D is the deviance, p is the number of parameters in the model, and α is either stant or a function of n. Two of the most commonly used forms of the GIC are Akaike's rmation criterion (AIC) where $\alpha = 2$ and Bayesian information criterion (BIC) where $= log(n)$. S-PLUS stepwise selection within the GAM framework is based on AIC. The C, including AIC, assumes MLE and independent observations and is a function of the ersion parameter. However: (1) GAMs are not MLEs, (2) Assuming that sets within s are independent is questionable, especially for loggerheads, (3) We do not have a good mate of the dispersion parameter, and (4) AIC may not be the optimal form of the GIC our data. The GIC with $\alpha = 2$ (AIC) leads to a ranking of the model in order of the mated mean square error of prediction, and under many situations, 2 is the optimum ue for α. But as n increases there will eventually be a point where larger values of α are imum (Atkinson 1980). Also, larger values of α are indicated if the prediction problem l conditioned, the matrix X^TX nearly singular (Atkinson 1980). Along these same lines, $\mu \to 0$ there is likely a point where larger values for α are optimum since $\mu = 0$ is not mable. When initially fitting the models and using AIC ($\alpha = 2$) and assuming a Poisson ily ($\phi = 1$), model diagnostics indicated that models were being overfitted. Because have a large n, over 3,000, and because a large proportion of these are zero, a larger ue of α is likely required for optimum model selection. Additionally, with such a high el of collinearity among explanatory variables, X^TX can quickly become ill conditioned. C adjusts for the sample size, and for the analyses in this paper, BIC is the GIC with $= log(3107) \cong 8$. However, even BIC in this circumstance may not be optimum. Atkinson 81) suggests that the range α =2 to 6 may provide a set of plausible initial models for ther analysis, but since $\alpha = 8$ is BIC, we extended this range.

or these four reasons, stepwise selection within S-PLUS was used only as an aid in ermining the final predictive model. Since we do not have a good estimate of ϕ and a her value for α than 2 is likely optimum, the dispersion parameter was specified over a ge of values from 1 to 10. The higher values for the dispersion parameter place a higher alty on adding a regressor, so we were adjusting for α as well as overdispersion. When ng stepwise selection, we recorded the final model selected and models with similar GIC ues. Under this framework, stepwise selection provided a useful tool.

or $\phi = 4$ to $\phi = 10$, the variables selected by stepwise selection were similar to those ected using classification trees and cross-validation. The similarities between the two are indication that by adjusting the dispersion parameter within the S-PLUS environment, C can be used as a tool for model selection. Furthermore, model diagnostics indicated t variables being selected were associated with take. When $\phi < 4$, model diagnostics icated that many of the variables selected showed marginal if any association with take.

Variables were introduced into the GAMs in the same manner as with the classifica- n trees, first in similar groups and then combined. Also, since selection was dependent on the order regressors were introduced, the order was varied. For continuous variabl smoothers with different degrees of freedom as well as polynomials of order 2 were consi ered. Polynomials place parametric constraints on the shape, and because of the proble with collinearity in using higher order polynomials, only polynomials of order 2 were consi ered. Under the GAM environment, polynomials are fitted as if under the GLM framewor consequently, issues such as residual degrees of freedom, standard-error bands, and tests significance are straightforward under a Poisson family. For nonparametric GAMs, we re on approximations and heuristics (Chambers and Hastie, 1993).

Once the GAMs or GLMs were fitted, informal verification of the goodness of fit w obtained through plots of residuals and estimated standard errors. Figure 6 is an example a diagnostic plot supplied in S-PLUS and used extensively in this analysis. The solid line the figure is the estimated scaled latitude curve $s(lat, 4)$ with 4 d.f. fitted to the loggerhea take data; only latitudes greater than $22°N$ were included in the data. The dashed lin lie approximately two standard errors away from the central curve on either side and gi a rough indication of the level of variability around the fitted curve. Even under Poiss assumptions and independence, the calculation of the standard errors in S-PLUS involv some crude approximations with unknown properties (Chambers and Hastie, 1993); henc it is recommended that these bands only be used for diagnostic purposes. Also, these ban should not be interpreted as confidence bands as there has been no adjustment for bias an the normality assumption is questionable. In Figure 6, the standard error band displays clear curvature that follows the curvature of the fitted curve but flares out near the endpoin of the latitude range. The fact that we cannot draw a horizontal line across the plot withou going outside the band provides evidence that latitude was associated with take.

The black circles on Figure 6 represent partial deviance residuals; these are simply the fi ted term plus the deviance residual (Chambers and Hastie, 1993). The deviance is a functio of the differences in the log-likelihoods and provides a measure of discrepancy between th fitted model and the saturated model; i.e., between the model and the data. The devianc residual for observation y_i is the square root of its contribution to the overall deviance mu tiplied by $sign(y_i - \hat{\mu}_i)$; i.e., it is positive if y_i is greater than its fitted value $\hat{\mu}_i$ and negativ if y_i is less than $\hat{\mu}_i$. For our data, zeros dominated the responses and $\hat{\mu}_i$ was consistentl near zero; therefore, responses with 0 takes have negative deviance residuals and response of 1 or greater have positive deviance residuals and greater absolute values. A satisfactor diagnostic plot typically has residuals distributed evenly and randomly above and below th fitted curve. Again, due to the nature of our data, the curve will be closest to the zer values, and symmetry is not expected since zero is a lower boundary for counts. A health fit is indicated by the positive residuals following the pattern of the curve; i.e., the distanc between the curve and the positive residuals is not distinctively greater in one section of th curve than in another.

Parts of the plot where the standard error band is particularly wide suggest that there ar problems with the fit. Poor fits are most likely to be caused by sparse data or by a choic of degrees of freedom of the smoother that is too low to give an adequate representation the relationship. Sparse data can be detected using the rug-plot along the bottom of Figur 6. The rug-plot gives the frequency of the x-values (Chambers and Hastie, 1993); wher the frequency is high the rug-plot is a solid block. In Figure 6, the rug-plot indicates ther were few observations at the higher latitudes; hence, the standard error band there is ver wide. The band widens at the lower range of latitudes because the reliability of a GAM fit i ays reduced at the endpoints of the range (Hastie and Tibshirani, 1990). If the diagnostic indicates that the data are too sparse for the fit to be satisfactory, an alternative model nulation based on other regressors might be considered.

or categorical variables an appropriate step function is produced. Figure 7 is the diagnos- plot for leatherback takes fitted to a model with four categories of latitude. The jittering esiduals at the base of the plot and around the horizontal lines result in solid bars because e are so many observations of the value zero; the width of the bars is proportional to number of observations in the category. In this example, the fit of the second category istinct from the others.

nteractions with nonparametric smooth terms are not fully supported in S-PLUS. One can lel an interaction term two dimensionally, $s(x_2, x_2)$, using the locally weighted regression oother, but, as mentioned in Section 3.3, the theoretical and numerical behavior of loess less clear. In our case there was no advantage to using GAMs, and once this was ermined, GLMs were used to fit the models. Likely two-way interactions were introduced the models and the stepwise procedure based on the GIC criterion was used in the same nner as for GAMs. None of the interactions tested appeared to be associated with take.

4. PREDICTION

nce the predictive model was selected, the take for all unobserved sets was predicted by stituting in the values recorded in the logbook for all regressors in the model and the ected take was used as the point estimate,

$$\hat{Y}_i = \hat{\mu}_i = \exp(\hat{\beta}_0 + \hat{\beta}_1 x_{i1} + \cdots + \hat{\beta}_p x_{ip}),$$

ere x_{ij} was the logbook value for regressor j on set i. The point estimate for total predicted e $\hat{Y}_+$ was the sum of predicted takes for unobserved sets added to the sum of takes for erved sets,

$$\hat{Y}_+ = \sum_{i=1}^{n} Y_i + \sum_{i=1}^{N-n} \hat{Y}_i,$$

ere n was the number of observed sets, and N was the number of longline sets recorded he logbooks.

Approximating prediction intervals. To measure the uncertainty in the point es- ates, prediction intervals were approximated. These are similar to confidence intervals wider. Confidence intervals measure the uncertainty in the parameter estimates and used when interval estimates for the mean response $\beta\mathbf{x}$ are required. When model-based imators are used to predict a total, we assume that the total is a random variable. Predic- n intervals take into account both the inaccuracy of parameter estimates, and the random ctuations in the unobserved takes around the mean, $\mu_i = \beta\mathbf{x}$. For example, if the average e of turtles per set is estimated as $\hat{\mu} = 1$. We do not really expect $\hat{\mu}$ to equal the true rage, so we calculate an interval, known as a confidence interval, that is expected to con- n the true value of μ. The probability that a confidence interval will enclose μ is called confidence coefficient. Now suppose that the true value of $\mu = 1$. We do not expect the e to equal 1 for every set but expect some takes to equal 0, others 1, and some greater n 1: this is what is meant by the variation around the mean.

To be independent from questionable asymptotic distributions, prediction intervals w approximated using a bootstrapping algorithm suggested in Davison and Hinkley (199 This resampling algorithm produces response variation in addition to variation in paran ter estimates. For the green, leatherback, and olive ridley turtles a parametric bootstr was used. There was no evidence that the counts were overdispersed or underdispersed these species and therefore a Poisson model was assumed. The basic algorithm was as follov

Algorithm:
For r=1,...,R,

1. created a bootstrap response y_i^* at $\mathbf{x_i}$ by
$$y_i^* = \hat{\mu}_i + \epsilon_i^* \sqrt{\hat{\mu}_i} (i = 1, ..., n),$$
where ϵ_i^* were generated Poisson variates with mean $\hat{\mu}_i$.
2. refitted the model with the y_i^*s and computed predicted totals $\hat{\mu}_{yr}^*$ for $yr = 1994, \cdots, 1$
3. for each year, calculated the sum of generated observed y_{yr}^* and calculated the statis
$$d_{yr}^* = \frac{y_{yr}^* - \hat{\mu}_{yr}^*}{\sqrt{\hat{\mu}_{yr}^*}}$$

Finally, the R values of d_{yr}^* were ordered to give $d_{yr,(1)}^* \leq \cdots \leq d_{yr,(R)}^*$. The predicti limits were calculated as

$$(\hat{\mu}_{yr} + d_{yr,((R+1)*.025)} \sqrt{\hat{\mu}_{yr}}, \hat{\mu}_{yr} + d_{yr,((R+1)*.975)} \sqrt{\hat{\mu}_{yr}}).$$

For approximating intervals, it is recommended that $R \geq 999$; R=999 was used in all boo strap approximations reported here.

For loggerheads, the data's error structure was modeled instead of assuming a Poiss distribution. The algorithm follows the one given above except for three changes.

1. ϵ_i was generated using Pearson residuals,
$$\frac{y - \mu}{\sqrt{\phi Var(\mu)}}.$$
For each trip, the mean of the Pearson residuals was calculated; let ϵ_t denote this me for trip t. Then, for all sets within a trip, the difference between the mean and t residual for that set was calculated; let ϵ_h denote this difference. Bootstrap samples were generated by drawing a random ϵ_t for each trip and adding a random ϵ_h for ea set,
$$\epsilon_i^* = \epsilon_t^* + \epsilon_h^*.$$
2. $\sqrt{\hat{\mu}_i}$ was replaced with $\sqrt{\hat{\mu}_i \hat{\phi}}$ where $\hat{\phi} = 1.015$, as discussed in Section 3.2.
3. As suggested by Davison and Hinkley (1997), stratification of residuals was necessa to create homogenous groups. Through trial and error, only stratification of ϵ_t w found necessary.

One drawback of this algorithm was that y^* could take on negative and non-integer valu To fix this, y^* was rounded to the nearest appropriate value. The appropriateness of th algorithm was confirmed using the diagnostics suggested in Davison and Hinkley (1997).

/e did not adjust the point estimates for bias, but the effect is implicitly adjusted for he bootstrap distribution used above. This algorithm was tried on the data for the :r turtle species, but was obviously performing poorly due to the extent of the zero takes ,ent. Since there was no evidence of overdispersion, it was felt that the approximated liction intervals calculated using the parametric algorithm were more accurate.

Estimating mortality. Mortality point estimates were calculated as described in ber (1998). The information used to estimate the probability of a kill given a take rovided in Table 2. Total kill was estimated by multiplying this probability by the es- ated number of takes. To calculate prediction intervals, the probability of dying p was ted as a binomial probability estimated from a sample size equal to the number of turtles)served for that species. The bootstrapping algorithms for takes were used for mortality liction intervals, but the y_i^*s and μ_i^*s were multiplied by $p_i^* = x_i^*/n$, where x_i^* was gener- l as a binomial variate with parameters n and $\hat{p}_i$. Due to the lack of information, these roximated prediction intervals do not take into account uncertainty in the estimates of probability that given its condition a turtle will die as a result of the interaction.

Adjusting for hardshells. Observed takes of unidentified hardshell turtles, only 10 ng 1994-1999, were allocated to loggerhead, olive ridley, or green turtle takes in the same portion as observed takes of these species. Except for green turtles, the species they were gned to was based on what species they were most likely to be. This was determined g the prediction models for each species. This was easily done by examining the sea ace temperature for the observation: olive ridley's takes were higher at warmer temper- :es, greater than $23.77°C$, and loggerhead takes were higher at cooler temperatures, less 1 $24.22°C$. If the sea surface temperature was not a clear indicator, the observed latitude used to determine the species since loggerhead takes were higher in the northern lati- es. The two observations where the choice between olive ridley or loggerhead was most biguous were split fractionally between the three species so that the desired proportions e acquired.

5. RESULTS

ome of the variables considered and found to be associated with take were poorly rep- nted in the logbooks from 1994 and 1999, and thus were not considered for prediction. prediction models used are given in Table 3. The maximal and minimal latitudes and surface temperatures recorded in the observed sets were close to the extremes in the books, and between these two extremes, the range of values were well represented in the erved sets. For loggerhead takes only sets with latitudes north of $22°N$ were included n fitting the final model. Observations below this latitude were all observations of zero e; $24.4°N$ was the southernmost location at which a positive take was recorded in the ervered sets. Including observations below $22°N$ resulted in an unstable model and nega- bias: the predicted take totals were 480, 390, 415, 350, 358, and 348 for years 1994-1999, pectively. The decision to truncate the data at $22°N$ was based on the stability of the del and where the fitted curves tended to 'flatten out' at $\hat{\mu} \approx 0$; with the Poisson model, annot equal zero.

'or the green turtle, none of the possible predictors appeared to have a strong association h take, but this could be a result of the small sample size in relation to the rarity of reen turtle take and does not mean that no relationships exist. For the olive ridley, loggerhead, and leatherback turtles, sea surface temperature, latitude, and the distance the approximate 17°C and 19°C isotherms were associated with take, but there was a h degree of collinearity between these variables. The plots in Figures 8-11 relate take to predictor variables. For the olive ridley turtle there was a clear distinction between proportion of takes between the two categories of sea surface temperature, but over latitu the pattern was less clear. For the loggerhead turtle where both latitude and sea surf temperature were in the model, there was a clump of positive observations at the hig latitudes and at these latitudes, the clump was located in the colder temperatures. Wh comparing loggerhead take with latitude versus the three classifications for month, th were fewer observed trips at the higher latitudes in months 5 and 6. Latitude was split i four categories for the prediction of leatherback take. The categories most southern and m northern had fewer observations but a higher proportion of positive takes. In the mid category representing the middle lower latitudes there was a high proportion of the obser sets but few positive takes. The middle category representing the middle higher latitu also had a high proportion of the observed sets, but it clearly had a greater proportion positive takes, but not as high as the two end categories.

Plots of annual take and kill for each species are given in Figures 12 to 15. The shape each plot represents the shape of the smoothed 'de-studentized' bootstrap distribution estimated take. The shape is mirrored around a line representing the prediction interval w the point estimate represented as a square. The shaded red area represents the estima proportion of the distribution above the 'trigger level' (authorized level of take or kill a given year), the proportion is given above each year's graph. These results are tabula in Tables 4 to 7. The probabilities that total take for loggerhead and leatherback turt exceeded the authorized incidental take in 1999 are very small. For olive ridley and gr turtles, the probabilities are larger but below 50%. The probabilities that total mortal exceeded the authorized mortality are very small for the green and loggerhead turtles a well below 50% for the leatherback turtle. For the olive ridley turtle, the point estim is above the trigger level, and the estimated probability is 66%. From 1995 to 1999, estimates for kill and take of olive ridley turtles appear rather stable with only the slight indication of an upward trend. The increased number of estimated leatherback takes in 1 and 1999 can be explained numerically by the increased percentage of trips below 14.95 latitude. From 1994 to 1997 there were from 409 to 610 sets in this area, in 1998 there 2,186 sets, and in 1999 there were 1,758 sets. In almost all cases, point estimates of t or kill fell clearly within the prediction intervals for earlier and later years; thus, there is evidence of a trend.

6. DISCUSSION

The point estimates of olive ridley mortality for 1995-1999 were above the authorized t level for this species stipulated in the current Biological Opinion. Out of 32 observed o ridley takes, 6 have been reported as dead with 3 of them in 1998 and 1 in 1999. T estimates for olive ridleys are below the authorized level for 1998 and 1999, although estimated probability that the take exceeded the level was 46% for 1999. All estimates leatherback, loggerhead, and green turtles were below the authorized take level.

It cannot be stressed strongly enough that since the observer program was an observatio study, only associations with take can be identified. It is not possible to make causa statements from this type of study. This fact must be kept in mind when interpreting dels used to predict take. Furthermore, these models were created with the objective of dicting take; under different objectives, a different model may be preferred.

FERENCES

inson, A. C.
980. A note of the generalized information criterion for choice of a model.
Biometrika 67, 413-418.

inson, A. C.
981. Likelihood ratios, posterior odds and information criteria.
. Econometrics 16, 15-20.

ambers, J. M., and T. J. Hastie.
993. Statistical models in S. Chapman and Hall, New York.

x, D. R.
983. Some remarks on over-dispersion. Biometrika 70, 269-74.

vison, A. C. and Hinkley, D. V.
997. Bootstrap methods and their application. Cambridge University Press, New York.

th, D.
987. On the efficiency of quasi-likelihood estimation. Biometrika 74, 233-45.

stie, T. J., and R. J. Tibshirani.
1990. Generalized additive models. Chapman and Hall, New York.

iber, P.
1998. Estimating annual takes and kills of sea turtles by the Hawaiian longline fishery, 1991-97, from observer program and logbook data. Honolulu Lab., Southwest Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Sci. Cent. Admin. Rep. H-98-08. 21pg.

Cullagh, P.
1983. Quasi-likelihood functions. Ann. Statist. 11: 59-67.

Cullagh, P., and J. A. Nelder.
1989. Generalized linear models, 2nd edition. Chapman and Hall, New York.

atistical Sciences Inc.
1993. S-PLUS reference manual. StatSci, a division of Mathsoft, Inc., Seattle.

nables, W. N. and Ripley, B. D.,
1999. Modern Applied Statistics with S-PLUS, 3rd Ed., Springer, New York.

TABLE 1. Explanatory variables considered for predicting total take

	Variable	Notes
Location in time and space	latitude (lat)	degrees north
	longitude (lon)	degrees east
	distance to 17°C isotherm	calculated from lat, lon, and ss
	distance to 19°C isotherm	calculated from lat, lon, and ss
	year	94-99, looked at pooling categories
	month	January-December, looked at pooling categories
	day	represented as a circular variable for a year using the cosine and sine functions
Condition of gear	hooks	
	hooks/float	
Environment	temperature	sea surface temperature (sst)
Catch of other species		total and proportion of total
	yellowfin	
	skipjack	
	albacore	
	swordfish	
	blue shark	
	mahimahi	
	striped marlin	
	blue marlin	
	wahoo	
	spearfish	
	opah	
	albatross	
Other	vessel length	registered length
	trip type	3 categories (swordfish,tuna,mi

TABLE 2. Observed turtle take and estimated probability (in parentheses) that a turtle was killed by the interaction with the fishery. Takes and estimates are given by condition and were calculated from the 1994-1999 observer data. The probability in the Total row was the probability used to estimate the total number of kills.

Condition	Loggerhead	Leatherback	Olive Ridley	Green
Hooked				
Released				
Internal	83	1	16	1
	(.29)	(.29)	(.29)	(.29)
External	56	23	10	8
	(0)	(0)	(0)	(0)
Unknown	3	4	0	0
	(.17)	(.01)	(.18)	(.03)
Dead	1	1	6	1
	(1)	(1)	(1)	(1)
Entangled				
Released				
Okay	3	3	0	0
	(0)	(0)	(0)	(0)
Injured	0	3	0	0
	(0)	(0)	(0)	(0)
Dead	0	2	0	0
	(1)	(1)	(1)	(1)
No record				
Released	1	3	0	0
	(.17)	(.01)	(.18)	(.03)
Total	147	40	32	10
	(.17)	(.08)	(.33)	(.13)

TABLE 3. Explanatory variables included in the prediction models

Species	Explanatory variables
Loggerhead	month in three categories: [1,2],[5,6],[3,4,7-12] latitude as a polynomial: $lat + lat^2$ sea surface temperature in two categories: $[sst \leq 23.77°C]$,$[sst > 23.77$
Olive Ridley	sea surface temperature in two categories: $[sst \leq 24.22°C]$,$[sst > 24.22$
Leatherback	latitude in four categories: $[lat \leq 14.95°N]$, $[14.95°N < lat \leq 24.84°N]$ $[24.84°N < lat \leq 33.82°N]$,$[lat > 33.82°N]$
Green	none

TABLE 4. Loggerhead take and kill estimates with 95% prediction intervals and probabilities that the real takes or kills exceeded the authorized levels. Authorized levels for take and kill for 1994-1997 were 305 and 46 and for 1998-1999 were 489 and 103.

		Takes			Kills	
Year	Est.	95 %PI	Prob.	Est.	95 %PI	Prob.
1994	501	[315-669]	.98	88	[36-141]	.95
1995	412	[244-543]	.90	72	[31-115]	.89
1996	445	[290-594]	.96	78	[34-127]	.92
1997	371	[236-482]	.82	65	[28-102]	.84
1998	407	[259-527]	.09	71	[32-112]	.06
1999	369	[234-466]	.01	64	[28-102]	.03

TABLE 5. Leatherback take and kill estimates with 95% prediction intervals and probabilities that the real takes or kills exceeded the authorized levels. Authorized levels for take and kill for 1994-1997 were 271 and 23 and for 1998-1999 were 244 and 19.

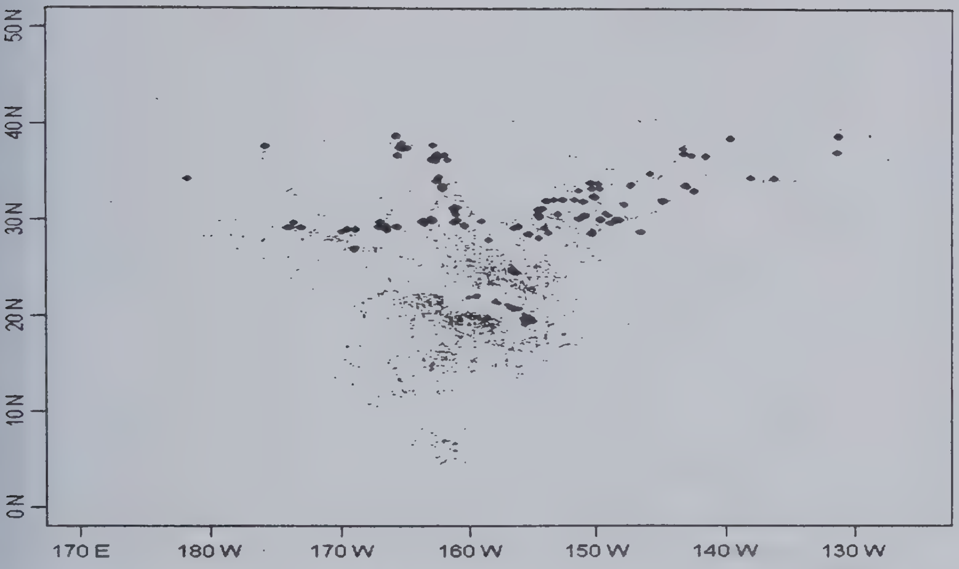
		Takes			Kills	
Year	Est.	95 %PI	Prob.	Est.	95 %PI	Prob.
1994	109	[68-153]	.00	9	[0-22]	.03
1995	99	[62-141]	.00	8	[0-21]	.02
1996	106	[69-148]	.00	9	[1-21]	.02
1997	88	[55-124]	.00	7	[0-18]	.00
1998	139	[79-209]	.00	12	[1-28]	.23
1999	132	[76-193]	.00	11	[1-27]	.20

TABLE 6. Olive ridley take and kill estimates with 95% prediction intervals and probabilities that the real takes or kills exceeded the authorized levels. Authorized levels for take and kill for 1994-1997 were 152 and 41 and for 1998-1999 were 168 and 46.

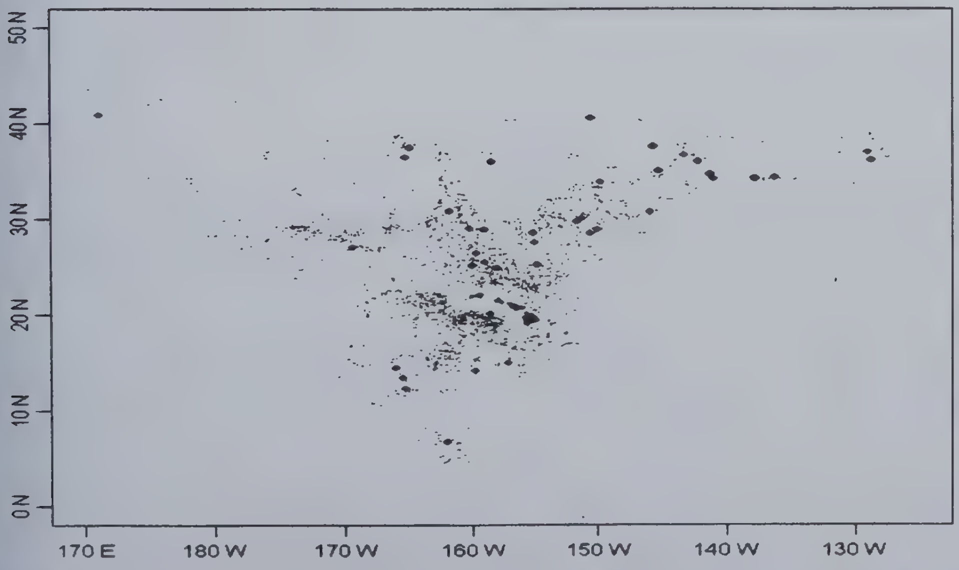
		Takes			Kills	
Year	Est.	95 %PI	Prob.	Est.	95 %PI	Prob.
1994	107	[70-156]	.04	36	[8-64]	.36
1995	143	[90-205]	.39	47	[7-84]	.63
1996	153	[103-210]	.53	51	[11-90]	.70
1997	154	[103-216]	.54	51	[8-92]	.70
1998	157	[102-221]	.38	52	[11-92]	.62
1999	164	[111-231]	.46	55	[11-96]	.66

TABLE 7. Green turtle take and kill estimates with 95% prediction intervals and probabilities that the real takes or kills exceeded the authorized levels. Authorized levels for take and kill for 1994-1997 were 119 and 18 and for 1998-1999 were 52 and 15.

		Takes			Kills	
Year	Est.	95 %PI	Prob.	Est.	95 %PI	Prob.
1994	37	[15-65]	.00	5	[0-16]	.01
1995	38	[15-70]	.00	5	[0-17]	.02
1996	40	[19-70]	.00	5	[1-17]	.02
1997	38	[14-73]	.00	5	[0-17]	.00
1998	42	[18-76]	.28	5	[1-19]	.06
1999	45	[18-82]	.34	6	[1-19]	.06


50 N
40 N
30 N
20 N
10 N
0 N
170 E
180 W
170 W
160 W
150 W
140 W
130 W

gure 1. Approximate positions of observed sets with positive loggerhead takes represented red dots and takes of zero represented as blue dots.


50 N
40 N
30 N
20 N
10 N
0 N
170 E
180 W
170 W
160 W
150 W
140 W
130 W

igure 2. Approximate positions of observed sets with positive leatherback takes represented s red dots and takes of zero represented as blue dots.

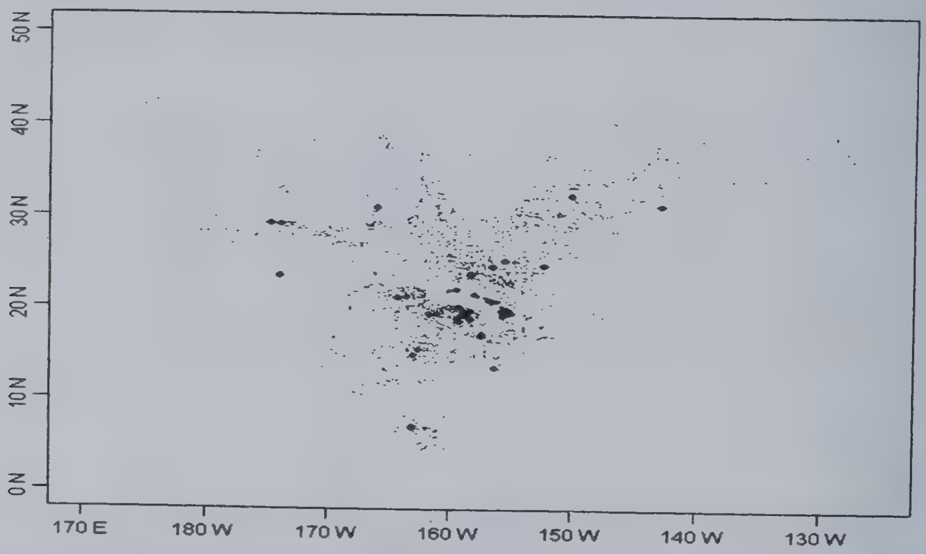

50 N
40 N
30 N
20 N
10 N
0 N
170 E
180 W
170 W
160 W
150 W
140 W
130 W

Figure 3. Approximate positions of observed sets with positive olive ridley takes represe
as red dots and takes of zero represented as blue dots.

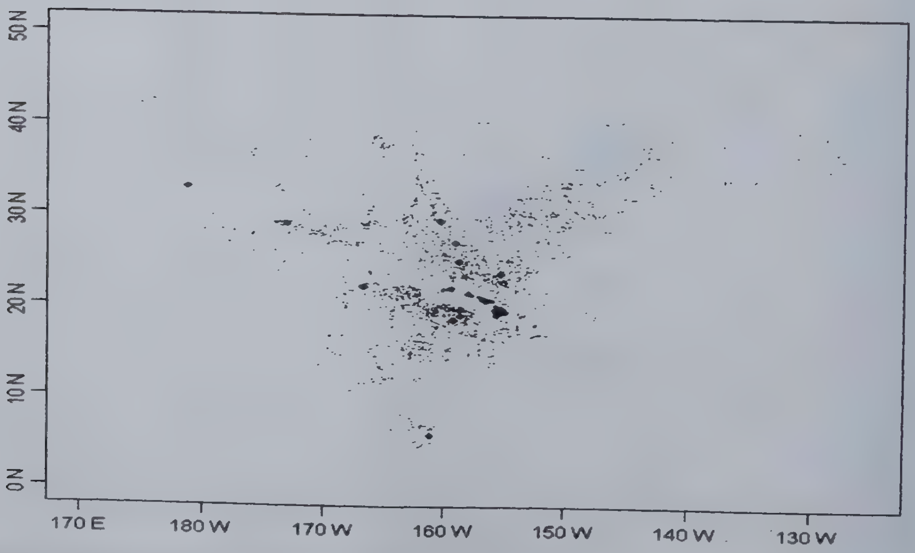
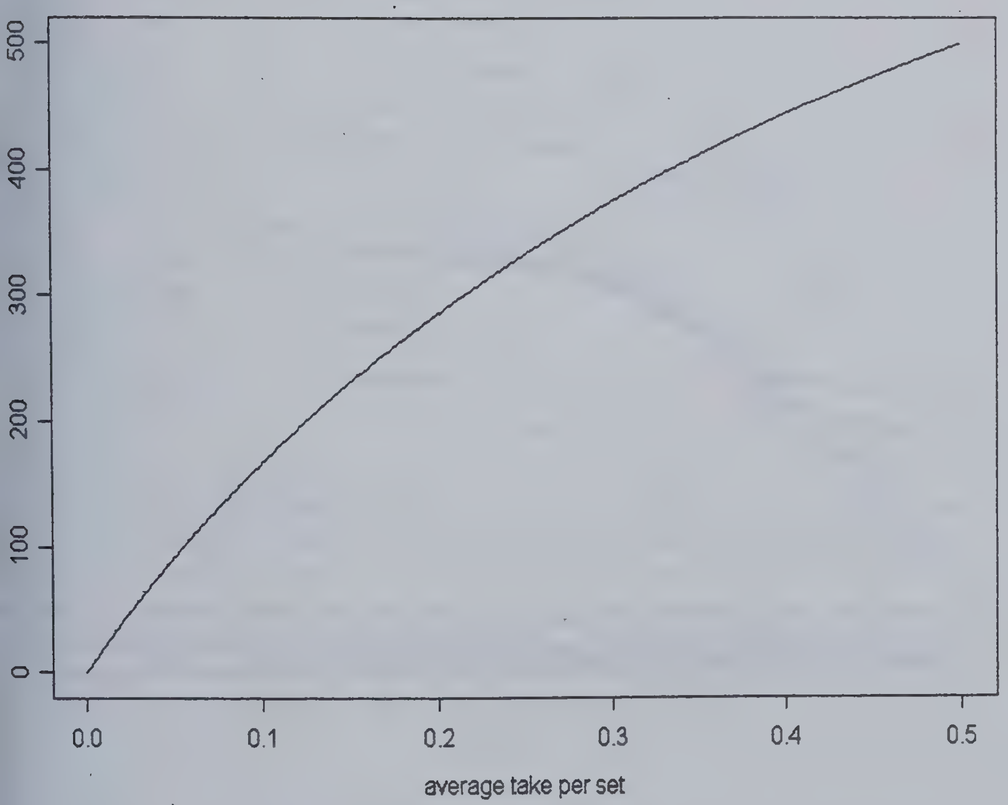

50 N
40 N
30 N
20 N
10 N
0 N
170 E
180 W
170 W
160 W
150 W
140 W
130 W

Figure 4. Approximate positions of observed sets with positive green turtle takes represen
as red dots and takes of zero represented as blue dots.



re 5. Approximate effective degrees of freedom assuming a Poisson distribution and independent observations.

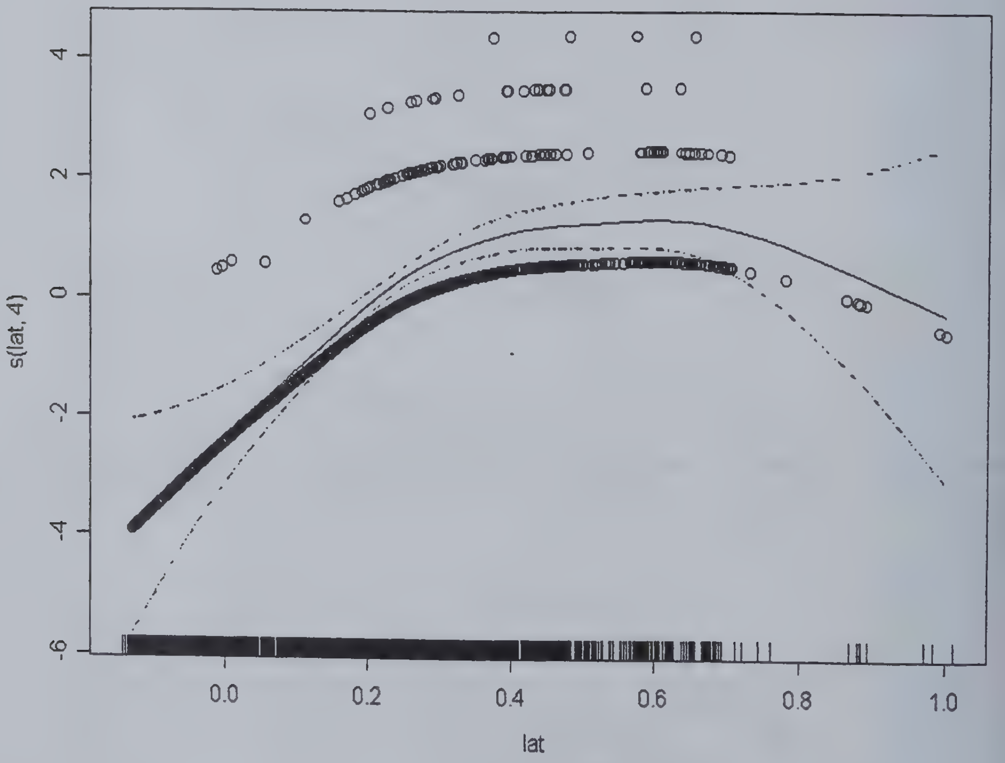
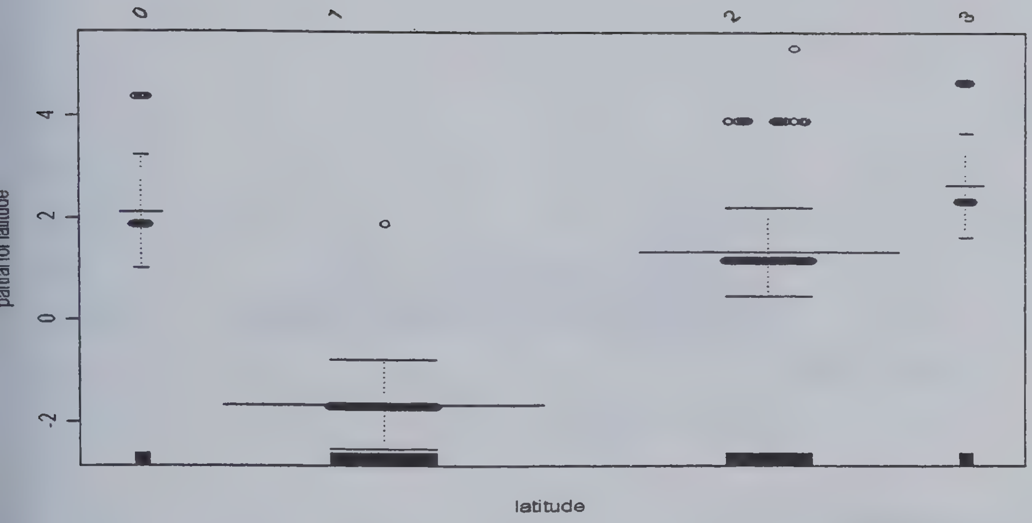


Figure 6. The fit of loggerhead take to the scaled latitude, for latitudes greater than or equ to 22°N. The solid line represents the fitted smooth curve with 4 degrees of freedom, t dashed lines denote the fitted smooth plus or minus 2 standard errors (approximate) a demarcate a "standard error band", the black circles represent partial deviance residua and the bars on the x-axis are the rug-plot. The residuals are well distributed above a below the curve and follow the basic line of the curve. The standard error band shows definitive curve and is narrow in the center of the curve, but wider at the right endpoi where there are few observations.



gure 7. The fit of leatherback take to latitude expressed in four categories: 0=[$lat \leq$ .95°N], 1=[14.95°$N < lat \leq$ 24.84°N], 2=[24.84°$N < lat \leq$ 33.82°N],3=[$lat >$ 33.82°N]. ne long horizontal solid line represents the fit. The length of this line is a function of the mber of observations in the category. The vertical lines are twice standard error bands, e jittered black circles represent partial deviance residuals, and the solid bars on the x-axis e the rug-plot. The fitted take in Category 1 is distinct from the others.

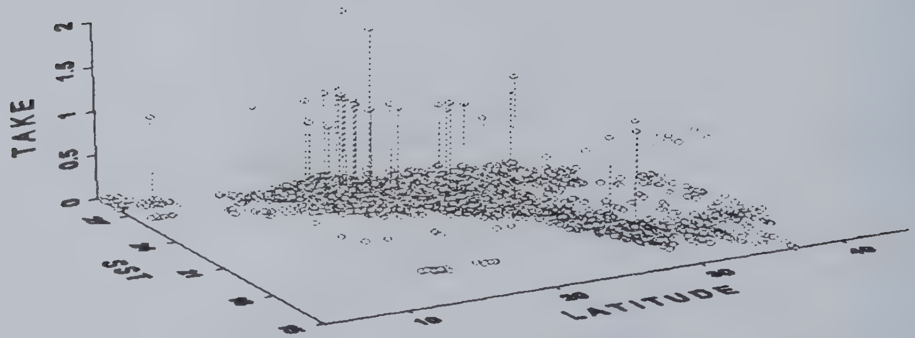


Figure 8. Takes of olive ridley versus latitude North and sea surface temperature deg
Celsius (SST). The different colors represent the two categories of sea surface temperat
split at 24.22°C used in the prediction models (See Table 3).

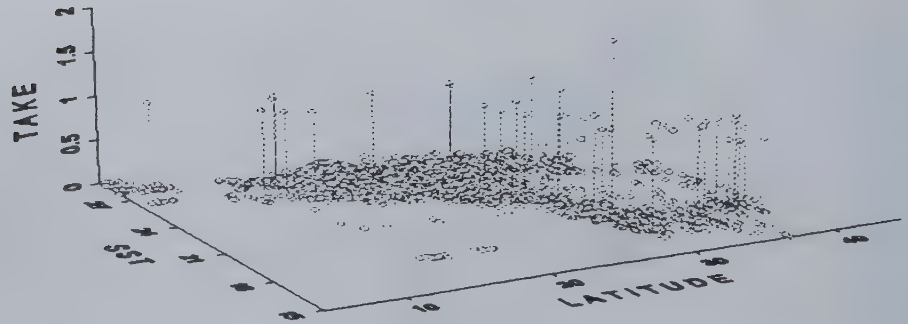
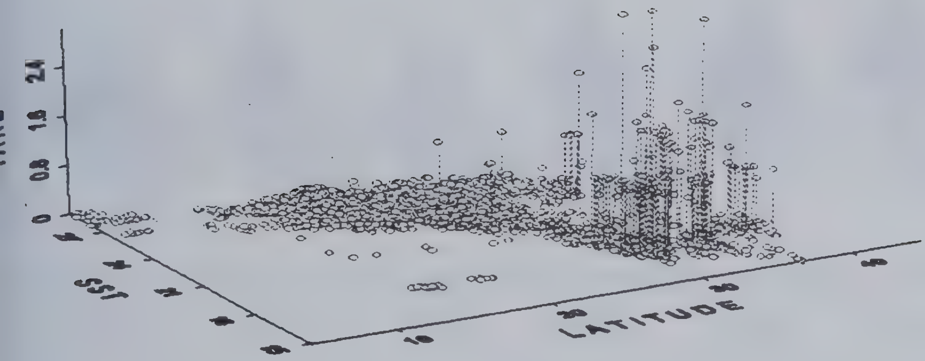
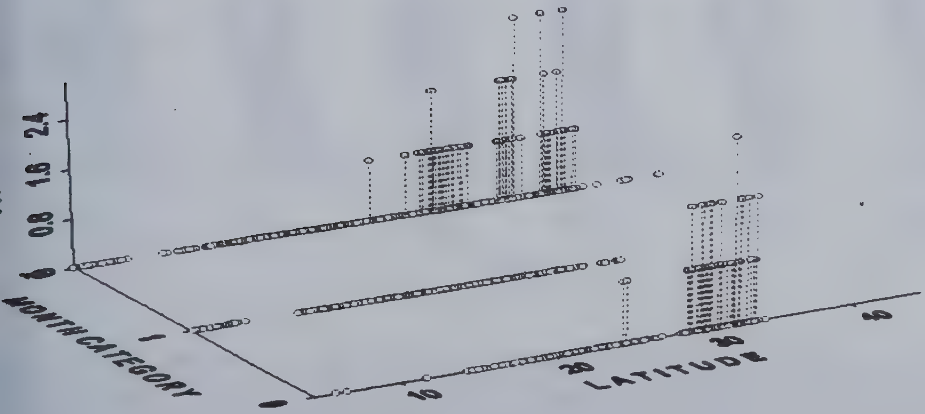


Figure 9. Takes of leatherback versus latitude North and sea surface temperature deg
Celsius (SST). The different colors represent the four categories of latitude split at 14.95
24.84°N, and 33.82°N used in the prediction models (See Table 3).



e 10. Takes of loggerhead versus latitude North and sea surface temperature degrees us (SST). The different colors represent the two categories of sea surface temperature at 23.77°C used in the prediction models (See Table 3).



e 11. Takes of loggerhead versus latitude North and month classification $(0 = \{1,2\}, 1 =$ $\}, 2 = \{3,4,7-12\}$). The different colors represent the two categories of sea surface erature used in the prediction models (red=$SST \leq 23.77°C$, blue=$SST > 23.77°C$).

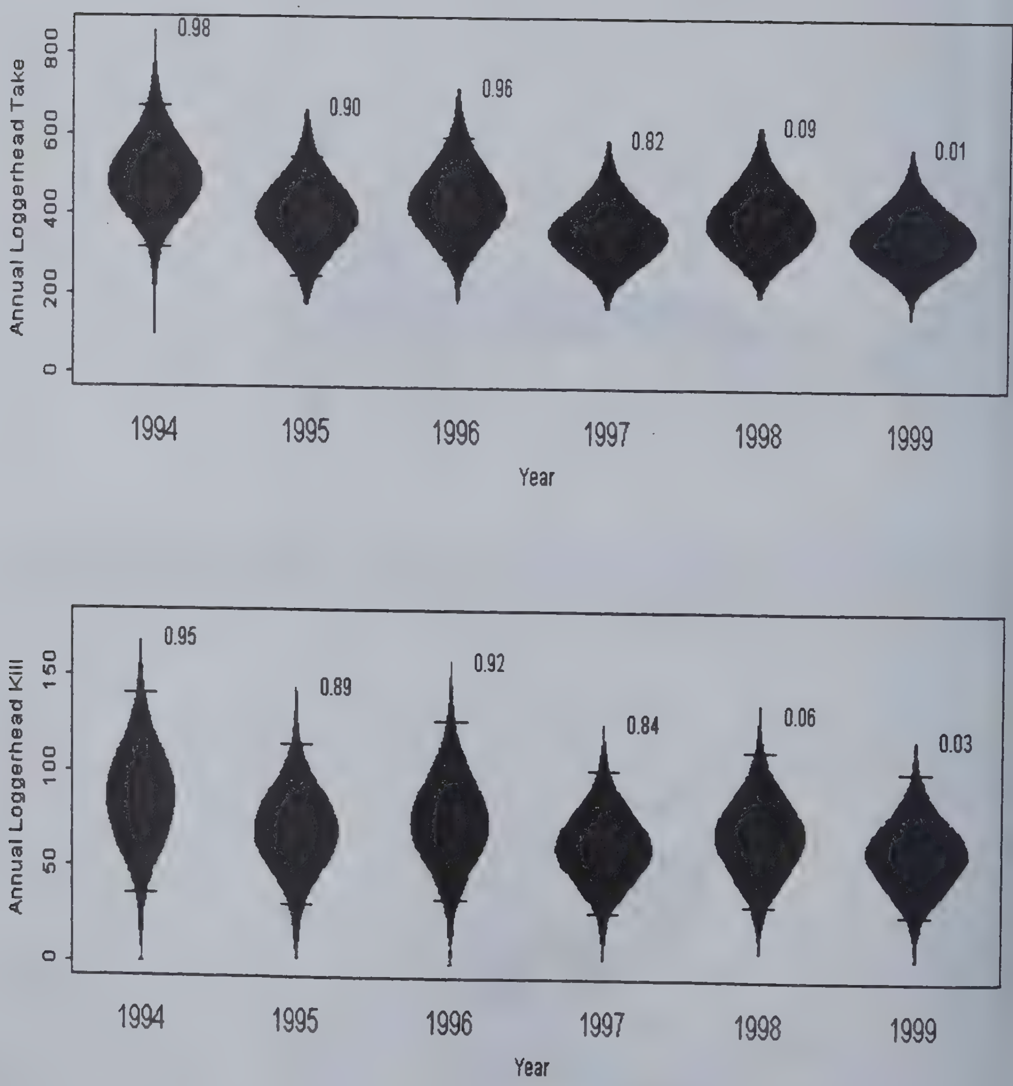
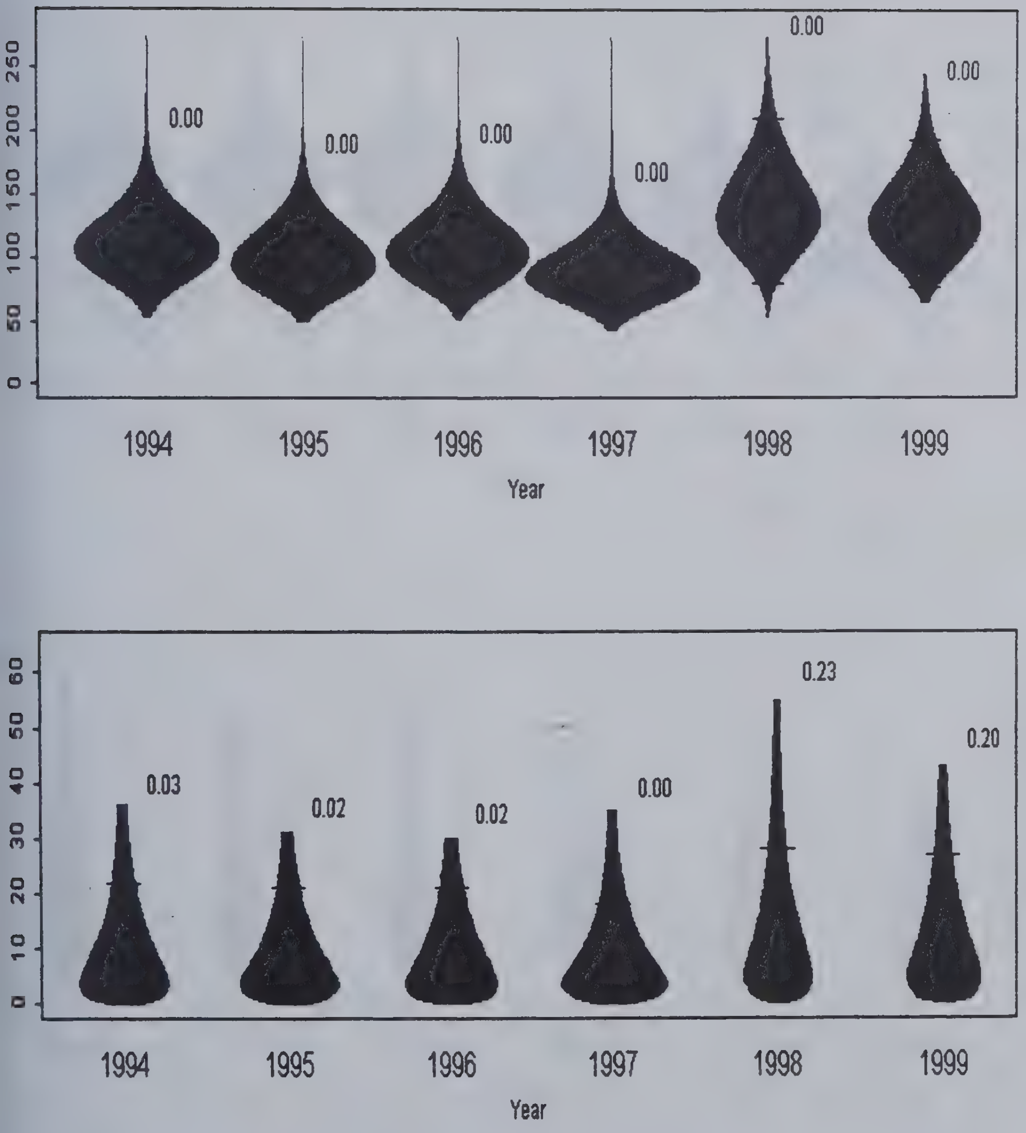


Figure 12. Take and kill estimates for loggerhead turtles. The approximate distributions estimated take and kill are mirrored around the prediction intervals (dark line with bars each end). The dark squares in the plots represent the point estimates. The proportio the distribution above the trigger level is shaded in red, and the estimated probability t the trigger level is exceeded is given above each year's plot.



ure 13. Take and kill estimates for leatherback turtles. The approximate distributions of mated take and kill are mirrored around the prediction intervals (dark line with bars at h end). The dark squares in the plots represent the point estimates. The proportion of distribution above the trigger level is shaded in red, and the estimated probability that trigger level is exceeded is given above each year's plot.

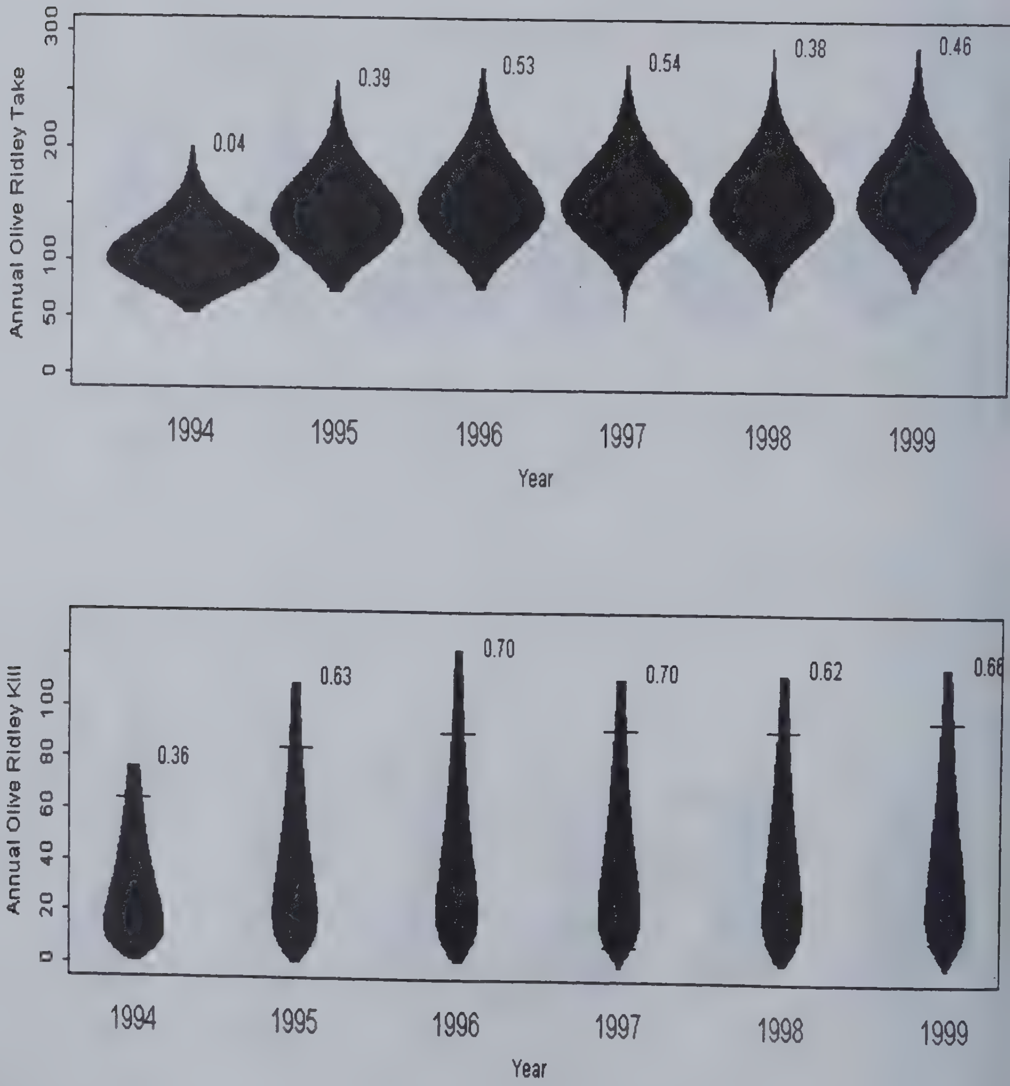
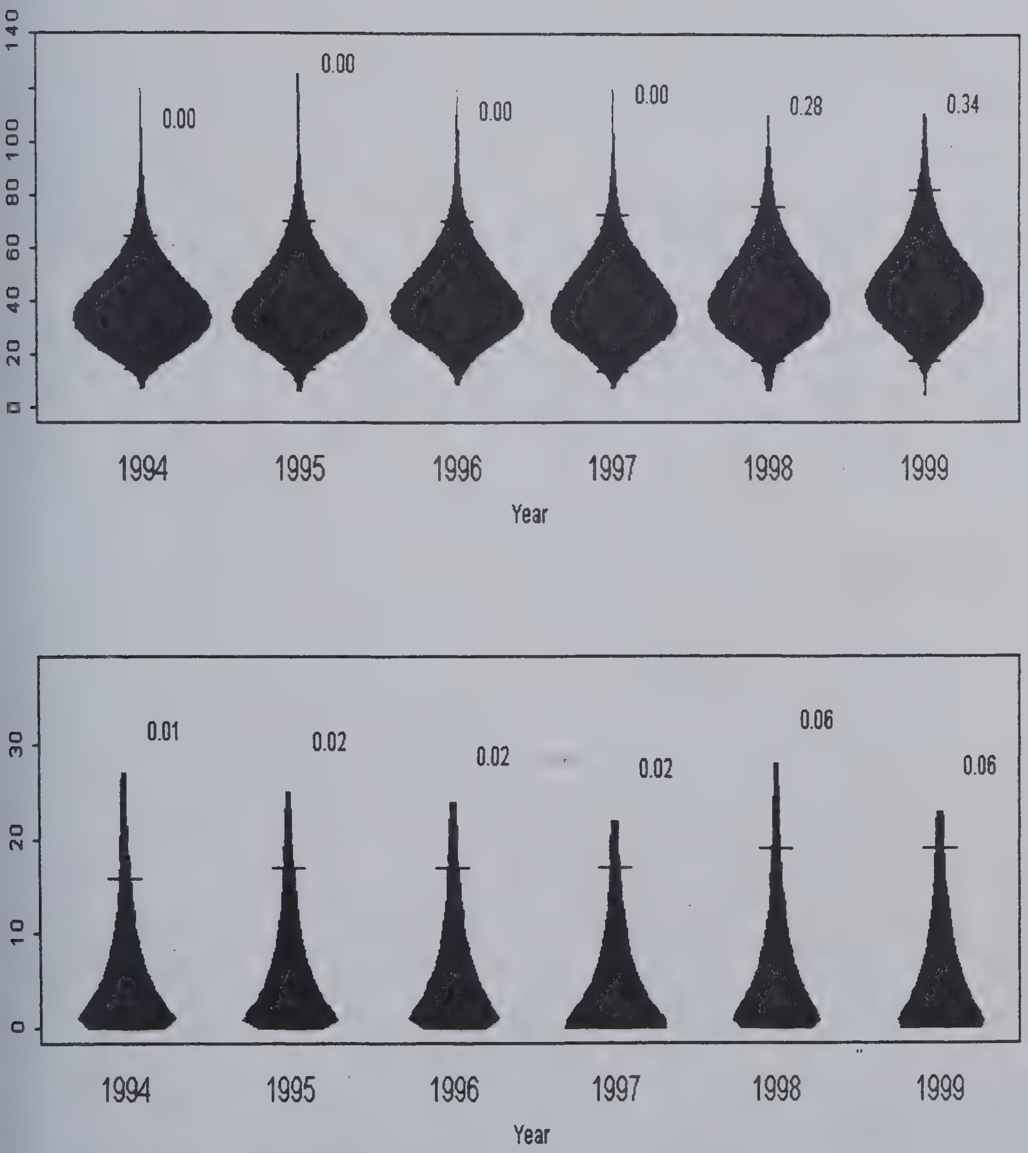


Figure 14. Take and kill estimates for olive ridley turtles. The approximate distributions estimated take and kill are mirrored around the prediction intervals (dark line with bars each end). The dark squares in the plots represent the point estimates. The proportion the distribution above the trigger level is shaded in red, and the estimated probability t the trigger level is exceeded is given above each year's plot.



ure 15. Take and kill estimates for green turtles. The approximate distributions of mated take and kill are mirrored around the prediction intervals (dark line with bars at h end). The dark squares in the plots represent the point estimates. The proportion of distribution above the trigger level is shaded in red, and the estimated probability that trigger level is exceeded is given above each year's plot.

APPENDIX H

Order Clarifying Order Modifying Provisions of Order of Injunction, Center for Marine Conservation *et al.*, vs. National Marine Fisheries Service *et al.*, Civil No. 99-00152, June 26, 2000.

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

ENTER FOR MARINE CONSERVATION;)
URTLE ISLAND RESTORATION)
ETWORK,) CV. NO. 99-00152 DAE
)
Plaintiffs,)
)
vs.)
)
ATIONAL MARINE FISHERIES)
ERVICE; NATIONAL OCEANIC AND)
TMOSPHERIC ADMINISTRATION;)
NITED STATES DEPARTMENT OF)
OMMERCE; WILLIAM DALEY,)
ECRETARY OF THE DEPARTMENT)
F COMMERCE,)
)
Defendants, and)
)
AWAIIAN LONGLINE ASSOCIATION,)
)
Defendant-Intervener.)
)

FILED IN THE
UNITED STATES DISTRICT COURT
DISTRICT OF HAWAII
JUN 26 2000
at 8 o'clock and 15 min. a M.
WALTER A. Y. H. CHINN, CLERK

ORDER CLARIFYING ORDER MODIFYING PROVISIONS OF ORDER OF INJUNCTION

The court filed its Order Modifying Provisions of Order f Injunction on June 23, 2000. Upon reviewing the Order, the ourt realized that in an effort to file the order as xpeditiously as possible critical language in paragraph 3 had een inadvertently deleted from the final draft. In addition, here may be some confusion with respect to the court's intent egarding the terms of closure in Area A.

Concurrent with the filing of this Order of larification the court has filed an Amended Order Modifying

Provisions of Order of Injunction restoring the inadvertentl deleted language. Paragraph 3 in its entirety now reads:

> 3. Within 30 days of the entry of this Order, all vessels that discharge pelagic longline sets will be required to carry a NMFS-approved observer. If 100% coverage is not achieved, all activity in the Hawaii Longline Fishery will be suspended until 100% observer coverage is attained. NMFS and or HLA may apply to this court upon good cause shown for a reasonable extension of time, not to exceed 180 days, to comply with the requirements of this paragraph. During the period of any such extension granted by the court, fishing may proceed in accordance with the other provisions of this Order. However, in the event such extension is granted by the court, NMFS and HLA must clearly demonstrate a concerted effort to meet the 100% observer-coverage requirement, including providing the court with a concrete and specific plan to achieve the observer requirements of this paragraph and such other requirements as the court may impose.

In addition, in order to dispel any confusion, the court intends that Area A be completely closed during the mon of April and May such that no fishing activity whatsoever be allowed in Area A during those two months. During the remain ten months of the year, the court intended that activity in Area A be restricted by allowing only 636 pelagic longline sets to be made in Area A subject to the terms set forth in the Amended Order Modifying Provisions of Order of Injunction.

IT IS SO ORDERED.

DATED: Honolulu, Hawaii, June 26, 2000.

DAVID ALAN EZRA
CHIEF UNITED STATES DISTRICT JUDGE

Center for Marine Conservation, et al. vs. National Marine Fisheries Service, et al., Civil No. 99-00152 DAE; ORDER CLARIFYING ORDER MODIFYING PROVISIONS OF ORDER OF INJUNCTION

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

CENTER FOR MARINE CONSERVATION;)
TURTLE ISLAND RESTORATION)
NETWORK,)
)
Plaintiffs,)
)
vs.)
)
NATIONAL MARINE FISHERIES)
SERVICE; NATIONAL OCEANIC AND)
ATMOSPHERIC ADMINISTRATION;)
UNITED STATES DEPARTMENT OF)
COMMERCE; WILLIAM DALEY,)
SECRETARY OF THE DEPARTMENT)
OF COMMERCE,)
)
Defendants, and)
)
HAWAIIAN LONGLINE ASSOCIATION,)
)
Defendant-Intervener.)

CV. NO. 99-00152 DAE

FILED IN THE
UNITED STATES DISTRICT
DISTRICT OF HAWAI
JUN 26 2000
at 8 o'clock and 15 min.
WALTER A. Y. H. CHINN, CL

AMENDED ORDER MODIFYING PROVISIONS OF ORDER OF INJUNCTION

The court heard the parties' motions on June 20, 2000. Paul H. Achitoff, Esq., appeared at the hearing on behalf of Plaintiffs; Anthony P. Hoang, Department of Justice Attorney, Theodore G. Meeker, Assistant United States Attorney, and Judson Feder, Agency Counsel, appeared at the hearing on behalf of Defendants; and George W. Brandt, Esq., Steven Y. Otaguro, Esq., Jeffrey W. Leppo, Esq., and James M. Lynch, Esq., appeared at the hearing on behalf of Defendant-Intervener. Having carefully considered Defendants', Defendant-Intervener's and Plaintiffs' motions to modify the injunction, the record and the submissions the parties, the court modifies the terms of injunction as set rth within this Order.

BACKGROUND

Pursuant to this court's Order Setting Terms of unction filed November 23, 1999, ("Injunction Order"), tional Marine Fisheries Service ("NMFS") had four months to mplete an analysis of the temporal and spatial distribution of teractions between sea turtles and Hawaii-based longline ssels and to determine which time and area closures would ovide the greatest benefit to the sea turtles. (Injunction der at 3.) Further, pursuant to this court's Order Amending der Setting Terms of Injunction filed January 11, 2000, Amended Injunction Order"), within two weeks of the completion the analysis, a three-person panel, consisting of one person lected by NMFS, one person selected by Plaintiffs, and one rson selected by Defendant-Intervener, was to review the alysis and make individual recommendations to NMFS. (Amended junction Order at 1.) Based upon these recommendations, NMFS s to make appropriate time and area closures based upon the eatest benefit to the sea turtles and considering the costs to e Hawaii-based pelagic longline fishery. (Injunction Order at 4.)

In the meantime, the court ordered NMFS to prohibit activities of the Hawaii Longline Fishery north of 28°N latitu and between 168°W and 150°W longitude. (Injunction Order at 4 The court provided a means for the injunction to be modified b requiring the parties to report their findings to date and an recommendations for modification of the Injunction Order base scientific evidence within 180 days of the date of entry of th Injunction Order. (Injunction Order at 4.)

Defendants NMFS, Defendant-Intervener Hawaii Longlin Association ("HLA") and Plaintiffs have each submitted propose modifications of the injunction. However, no party suggests t there should not be a closure area. It is also undisputed tha several turtle species which use and traverse the affected are are seriously threatened or endangered.

On May 5, 2000, NMFS filed a Motion to Modify Provis of Order of Injunction. They propose prohibiting longline fishing (1) throughout the year, between 30°N latitude and 44° latitude between the meridians of 137°W and 173°E longitude, a (2) during April and May, between 23°N latitude and 44°N latitude, as well as between 6°N latitude and 16°N latitude, between the meridians of 137°W and 173°E longitude. Notwithstanding the prohibition, NMFS would allow 636 longlin sets to be made in the closed areas annually, provided that vessels making such sets carry a NMFS-approved observer. NMF so proposes that it develop and analyze alternatives to niting closures to swordfish and mixed-target trips during ril and May. NMFS intends to implement the modified time and ea closure through a proposed and final rulemaking process ich will take approximately six months to complete.

NMFS believes its proposal will reduce the number of atherback interactions by 34-43%, loggerhead interactions by -57% and green sea turtle interactions by 6-8%; olive ridley teractions would increase by 3-4%. NMFS believes that the gative impact on fishery revenues would be about 7-8%.

On June 2, 2000, HLA filed a Motion to Modify Order of junction and an Opposition. HLA bases its modification on the 98 Biological Opinion ("BO"). HLA proposes prohibiting all ngline fishing within the area encompassed and bounded by north 34°N latitude and west of 150°W longitude ("Area 1"). Other t spots could be identified with satellite technology and be osed based upon observed take. In addition, longline fishing uld be restricted within the area encompassed and bounded by rth of 28°N latitude and between 168°W and 150°W longitude Area 2"). Swordfish and mixed trip longline fishing would be rmitted in Area 2 provided that (1) all vessels making such ts carry a NMFS-approved observer and (2) 70% of the authorized cidental takes or mortalities (171 takes or 13 mortalities) of atherbacks is not exceeded. If the level of incidental takes is reached, all swordfish and mixed trips would cease both wi and outside of this area.

HLA's proposal would permit longline fishing outsid Areas 1 and 2, provided that (1) 20% of all longline vessels making sets carry a NMFS-approved observer; and (2) 70% of th authorized incidental takes or mortalities (171 takes or 13 mortalities) for listed leatherback turtle species is not exceeded. Upon reaching the 70% level, all swordfish and mix trip longline fishing would be prohibited. Tuna longline fis would continue until the authorized incidental take or mortal levels for listed leatherback turtle species is met (244 take 19 mortalities), at which time all longline fishing would cea

Another HLA proposal is to limit the rest period between set and retrieval for swordfish and mixed trips, such that the rest period does not exceed four hours within Area 2 five hours outside Areas 1 and 2.[1] HLA also suggests tagging incidentally-taken turtles to assess post-hooking mortality a movement, and establishing an economically-viable observer program. Finally, HLA requests that this court require NMFS t complete its Environmental Impact Statement ("EIS") by January 2001.

---

[1] The duration of swordfish and mixed trip longline sets presently varies from 6-8 hours. Crews normally rest for 5-7 hours before retrieving the set. A shorter rest period means reduction in soak time, which will result in fewer impacts on turtles that become engaged in longline gear.

Plaintiffs filed a Cross-Motion to Modify Injunction nd Opposition to Defendants' Motion to Modify Injunction on June , 2000. Plaintiffs oppose NMFS's proposal because it offers nadequate protection to the sea turtles. They state that the BO s outdated, that new data indicates that the leatherback's tatus is rapidly changing for the worse, and that these new indings compel immediate and forceful action. Plaintiffs seek o expand the current closure area by closing all water north of 9°N year-round and the remaining waters of the fishery April hrough July. Plaintiffs indicate that this proposal would save 5% of fishing revenue and 75% of leatherback sea turtles.

Plaintiffs later filed an Opposition to HLA's Motion to odify Order of Injunction, on June 9, 2000. Plaintiffs state hat almost no longlining occurs in the waters of HLA's proposed losure, which are far north of the best fishing grounds.

HLA filed a Memorandum in Opposition to Plaintiffs' ross-Motion on June 9, 2000. Defendants filed a Memorandum in eply to Plaintiffs' and Defendant-Intervener's Oppositions on une 9, 2000.

DISCUSSION

It is undisputed that "sound judicial discretion may all for the modification of the terms of an injunctive decree if he circumstances, whether of law or fact, obtaining at the time of its issuance have changed, or new ones have since arisen. System Fed'n. No. 91, Ry. Employees' Dep't., AFL-CIO v. Wrig 364 U.S. 642, 647 (1961). Thus, this court has discretion t modify its previous injunction. All parties concur that some form of modification of the present injunction is warranted, although they disagree as to the parameters of the modificati

Additionally, this court recognizes that:

> [w]hen a court has found that a party is in violation of NEPA, the remedy should be shaped so as to fulfill the objectives of the statute as closely as possible, consistent with the broader public interest....The court should tailor its relief to fit each particular case, balancing the environmental concerns of NEPA against the larger interests of society that might be adversely affected by an overly broad injunction.

Environmental Defense Fund v. Marsh, 651 F.2d 983, 1005-06, (Cir. 1981); See Western Oil & Gas Ass'n. v. Alaska, 439 U.S. (1978).

After careful review and thorough consideration of proposed modifications submitted by each party, the supportin and opposing memoranda, scientific and other evidence, oral a written arguments, the court has drafted carefully and narrow tailored modifications to its previous injunction. The court believes that these modifications will achieve the required balance by providing the best possibility to save sea turtles specifically the leatherback turtle, while minimizing to the

gree possible economic harm to the Hawaii Longline Fishery.
s, the court hereby orders that:

1. Within 30 days of the date of entry of this Order,
S shall prohibit all activities of the Hawaii Longline Fishery
horized by the Fishery Management Plan for the pelagic
sheries of the Western Pacific Region, as amended: (1) between
N and 44°N latitude between the meridians of 137°W and 173°E
ngitude throughout the year; and (2) between 6°N and 30°N
itude, between the meridians of 137°W and 173°E longitude,
ring the months of April and May ("Area A").

2. Notwithstanding the closure of Area A, a total of
pelagic longline sets will be allowed to be made in Area A
nually, provided that the rest period between set and retrieval
longline sets for all trips does not exceed four hours.[2] For
e year 2000, the number of sets allowed in Area A will be
lculated on a pro-rata basis according to the number of days
maining in the calendar year when the closures takes effect.

3. Within 30 days of the entry of this Order, all
ssels that discharge pelagic longline sets will be required to
rry a NMFS-approved observer. If 100% coverage is not

---

[2] Normally crews rest 5-7 hours between setting the lines and
trieving the set. Reduction in crew rest time to 4 hours will
sult in a 10-20% reduction in overall soak time, which will
sult in proportionately fewer impacts on turtles that become
tangled in longline gear. Provision of the 636 sets will allow
r collection of valuable data on sea turtle populations and
ll help minimize negative economic impact to HLA.

achieved, all activity in the Hawaii Longline Fishery will be suspended until 100% observer coverage is attained. NMFS and o HLA may apply to this court upon good cause shown for a reasonable extension of time, not to exceed 180 days, to comply with the requirements of this paragraph. During the period of any such extension granted by the court, fishing may proceed in accordance with the other provisions of this Order. However, i the event such extension is granted by the court, NMFS and HLA must clearly demonstrate a concerted effort to meet the 100% observer coverage requirement, including providing the court wi a concrete and specific plan to achieve the observer requiremen of this paragraph and such other requirements as the court may impose.

4. NMFS will continue to require every vessel with a Hawaii Longline limited entry permit to carry and use NMFS-approved line clippers and dip nets to disengage any hooked or entangled sea turtles with the least harm possible to the turtles.

5. NMFS will continue its research into the effects several different gear modifications.

6. This injunction will remain in effect until completion of the EIS. NMFS must accelerate completion of the EIS such that it will be completed by April 1, 2001. The court recognizes that NMFS is faced with budgetary restraints, howeve

it was NMFS's noncompliance with NEPA that caused the current situation. Accordingly, NMFS must comply with NEPA in an expeditious manner so as to avoid undue burden on HLA and minimize damage to the turtle species.

7. The injunction as set forth in this court's Order Setting Terms of Injunction, filed November 23, 1999, will remain in effect until the closure area set forth in this Order is implemented.

IT IS SO ORDERED.

DATED: Honolulu, Hawaii, June 26, 2000.

DAVID ALAN EZRA
CHIEF UNITED STATES DISTRICT JUDGE

Center for Marine Conservation, et al. vs. National Marine Fisheries Service, et al., Civil No. 99-00152 DAE; AMENDED ORDER MODIFYING PROVISIONS OF ORDER OF INJUNCTION

APPENDIX I

Order Further Amending Order Modifying Provisions of Order of Injunction, Center for Marine Conservation *et al.*, vs. National Marine Fisheries Service *et al.*, Civil No. 99-00152, August 4, 2000.

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

CENTER FOR MARINE CONSERVATION; TURTLE ISLAND RESTORATION NETWORK,

Plaintiffs,

vs.

NATIONAL MARINE FISHERIES SERVICE; NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION; UNITED STATES DEPARTMENT OF COMMERCE; WILLIAM DALEY, SECRETARY OF THE DEPARTMENT OF COMMERCE,

Defendants, and

HAWAIIAN LONGLINE ASSOCIATION,

Defendant-Intervener.

CV. NO. 99-00152 DAE

FILED IN THE
UNITED STATES DISTRICT COURT
DISTRICT OF HAWAII

AUG 4 2000

at 3 o'clock and 35 min. P M
WALTER A.Y.H. CHINN, CLERK

ORDER FURTHER AMENDING ORDER MODIFYING PROVISIONS OF ORDER OF INJUNCTION

On July 18, 2000, the court heard motions by Defendant-Intervener Hawaii Longline Association and Defendants National Marine Fisheries Service, et al., for reconsideration of the court's Amended Order Modifying Provisions of Order of Injunction filed June 26, 2000. Paul H. Achitoff, Esq., appeared at the hearing on behalf of Plaintiffs; Theodore G. Meeker, Assistant United States Attorney, appeared at the hearing on behalf of Defendants; and George W. Brandt, Esq., appeared at the hearing on behalf of Defendant-Intervener. Having carefully considered Defendants' and Defendant-Intervener's motions, the record and the submissions of the parties, the court further amends the terms of injunction as set forth in this Order.

BACKGROUND

The pertinent background facts are set forth in this court's June 26, 2000 Amended Order Modifying Provisions of Ord of Injunction.

DISCUSSION

It is undisputed that "sound judicial discretion may call for the modification of the terms of an injunctive decree the circumstances, whether of law or fact, obtaining at the time of its issuance have changed, or new ones have since arisen." System Fed'n. No. 91, Ry. Employees' Dep't., AFL-CIO v. Wright, 364 U.S. 642, 647 (1961). Thus, this court has discretion to modify its previous injunction. All parties concur that some form of modification of the present injunction is warranted in light of new information now available to the court, although they disagree as to the parameters of the modification.

Additionally, this court recognizes that:

> [w]hen a court has found that a party is in violation of NEPA, the remedy should be shaped so as to fulfill the objectives of the statute as closely as possible, consistent with the broader public interest . . . . The court should tailor its relief to fit each particular case, balancing the environmental concerns of NEPA against the larger interests of society that might be adversely affected by an overly broad injunction.

nvironmental Defense Fund v. Marsh, 651 F.2d 983, 1005-06, (5th ir. 1981); *See Western Oil & Gas Ass'n. v. Alaska*, 439 U.S. 922 1978).

After careful review and thorough consideration of the roposed modifications submitted by each party, the supporting nd opposing memoranda, scientific and other evidence, oral and ritten arguments, the court has drafted carefully and narrowly ailored modifications to its previous injunction. The court elieves that these modifications will achieve the required alance by providing the best possibility to save endangered sea urtles, specifically the leatherback turtle, while minimizing to he degree possible economic harm to the Hawaii Longline Fishery. hus, the court hereby orders that:

1. The prohibition on all activities of the Hawaii ongline Fishery authorized by the Fishery Management Plan for he Pelagic Fisheries of the Western Pacific Region, as amended, orth of 28° North latitude and between 168° West longitude and 50° West longitude, provided in the court's Order Setting Terms f Injunction filed November 23, 1999, shall remain in full force nd effect. No longline fishing in this area shall be permitted t any time. This area is designated on the attached map as area A."

2. Effective three (3) days after entry of this Order, ll activities of the Hawaii Longline Fishery north of 28° North atitude between 173° East longitude and 168° West longitude and etween 137° West longitude and 150° West longitude, shall be

prohibited until further order of this court, excepting, howeve that a total of 370 pelagic longline sets, on an annualized basis, may be fished in the areas described in this paragraph. For the remainder of the year 2000, 154 longline sets will be allowed in this area. Then, from January 1, 2001 through March 14, 2001, 77 longline sets will be allowed. In the event the E is not complete by April 2001, the court will reassess the appropriate number of sets allowed for the remainder of the yea This area is designated on the attached map as area "B."

3. Notwithstanding the limited fishing permitted by the preceding paragraph, all longline vessels fishing in the areas described in the preceding paragraph must carry a NMFS-approved observer, effective upon entry of this Order. If 100% coverage is not achieved, all activity of the Hawaii Longline Fishery north of the 28° North latitude will be suspended immediately until 100% observer coverage is attained.

4. Within three (3) days after entry of this Order, all longline fishing by the Hawaii Longline Fishery south of 28° North latitude and north of the equator targeting swordfish, whether exclusively or in "mixed sets," shall be prohibited. Further, the landing in any port within the territory of the United States, or the sale by any longline permit-holder or its agents, of any swordfish incidentally caught by a Hawaii longlin vessel between the equator and 28° North latitude shall be limited, as any "profits" obtained from the landing and sale of swordfish landed in this area must be donated to charity. A

written report of any swordfish incidently caught in the area described in this paragraph shall be filed with the Honolulu Office of NMFS within five days of the vessel returning to port on the trip in which the swordfish was caught. This area is designated on the attached map as area "C."

5. Within one and one-half months after entry of this Order, not less than ten percent of all vessels fishing between the equator and 28° North latitude must carry a NMFS-approved observer. Further, within three (3) months after entry of this Order, not less than twenty percent of all vessels fishing in this area must carry a NMFS-approved observer. If at any time during the effectiveness of this Order the observer coverage drops below these levels, all activity of the Hawaii Longline Fishery between 28° North latitude and the equator will be suspended until the required coverage threshold is attained.

6. A copy of all observer reports prepared by the NMFS-approved observers in the Hawaii Longline Fishery shall be submitted on the first day of each month to the court and to the attorneys for each of the parties. In the event that such reports disclose excessive turtle catch, the parties may apply to the court for appropriate further relief.

7. Notwithstanding the other provisions of this Order regarding the fishing that may continue during the effective date of this Order, all longline fishing shall be prohibited from March 15 until May 31.

8. This injunction will remain in effect until furt order of this court. NMFS must accelerate completion of the E such that it will be completed by April 1, 2001. NMFS may appl to this court upon good cause shown for a reasonable extension time to complete the EIS. In the event such extension is granted, however, all other provisions of this Order will remai in effect. NMFS must file a report within the court each 45 da detailing their progress in preparing the EIS.

9. NMFS will continue to require every vessel with a Hawaii longline limited entry permit to carry and use NMFS-approved line clippers and dip nets, and to disengage any hooke or entangled turtles with the least harm possible to the turtle

10. NMFS will continue its research into the effects of gear modifications.

IT IS SO ORDERED.

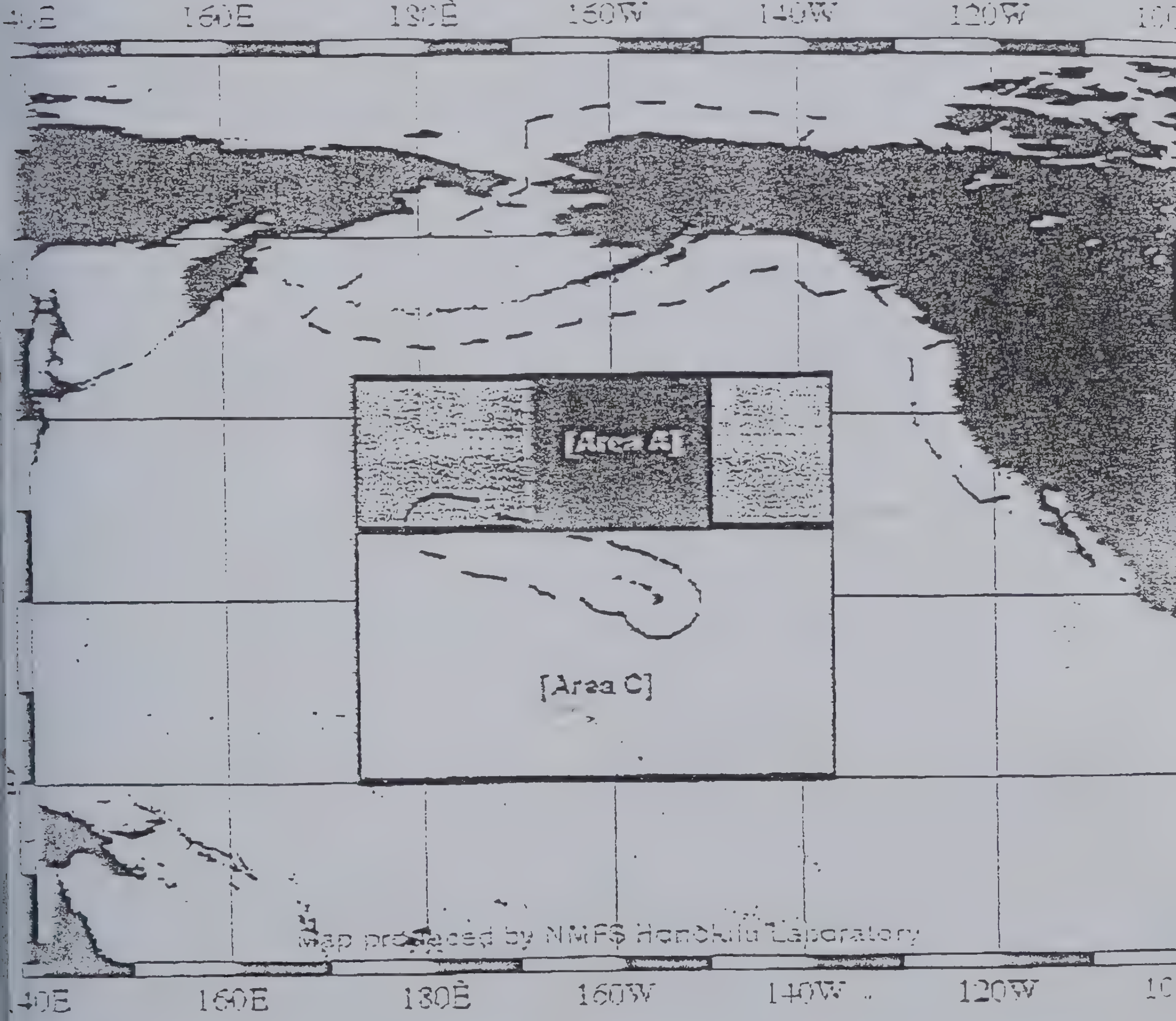
DATED: Honolulu, Hawaii, AUG 4 2000

DAVID ALAN EZRA
CHIEF UNITED STATES DISTRICT JUDG

Center for Marine Conservation, et al. vs. National Marine Fisheries Service, et al., Civil No. 99-00152 DAE; ORDER FURTHE AMENDING ORDER MODIFYING PROVISIONS OF ORDER OF INJUNCTION

Hawaii Longline Fishery: Delineation of Area Closures

Court-ordered Closures 8/03/2000


160E
180E
160W
140W
120W
[Area A]
[Area C]
Map produced by NMFS Honolulu Laboratory

ea A: 44 North - 28 North, 168 West - 150 West
ea B: 44 North - 28 North, 173 East - 168 West and 150 West - 137 West
ea C: 28 North - Equator (0 North), 173 East - 137 West

APPENDIX J

Excerpts from the Magnuson-Stevens Fisheries Management and Conservation Act as Amended through October 11, 1999.

Excerpts From the

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Public Law 94-265

As amended through October 11, 1996

AN ACT

To provide for the conservation and management of the fisheries, and for other purposes.

TABLE OF CONTENTS

Sec. 2.* Findings, purposes, and policy.
Sec. 3. Definitions.
Sec. 4. Authorization of Appropriations.

TITLE I -- UNITED STATES RIGHTS AND AUTHORITY REGARDING FISH AND FISHERY RESOURCES

Sec. 101. * United States sovereign rights to fish and fishery management authority.
Sec. 102.* Highly migratory species.

TITLE II -- FOREIGN FISHING AND INTERNATIONAL FISHERY AGREEMENTS

Sec. 201. Foreign fishing.
Sec. 202. International fishery agreements.
Sec. 203. Congressional oversight of international fishery agreements.
Sec. 204. Permits for foreign fishing.
Sec. 205. Import prohibitions.
Sec. 206. Large-scale driftnet fishing.
Sec. 206a. Denial of port privileges and sanctions for high seas large-scale driftnet fishing.

TITLE III -- NATIONAL FISHERY MANAGEMENT PROGRAM

Sec. 301.* National standards for fishery conservation and management.
Sec. 302. * Regional fishery management councils.
Sec. 303. * Contents of fishery management plans.
Sec. 304. * Action by Secretary.
Sec. 305. Other requirements and authority.
Sec. 306. State jurisdiction.
Sec. 307. Prohibited acts.
Sec. 308. Civil penalties and permit sanctions.
Sec. 309. Criminal offenses.
Sec. 310. Civil forfeitures.
Sec. 311. Enforcement.
Sec. 312. Transition to sustainable fisheries.
Sec. 313. North Pacific fisheries conservation.
Sec. 314. Northwest Atlantic Ocean fisheries reinvestment program.

TITLE IV -- FISHERY MONITORING AND RESEARCH

Sec. 401. Registration and information management.
Sec. 402. Information collection.
Sec. 403. Observers.
Sec. 404. Fisheries research.
Sec. 405. Incidental harvest research.
Sec. 406. Fisheries systems research.
Sec. 407. Gulf of Mexico red snapper research.
Appendix

* Indicates sections included in this Appendix

C. 2. FINDINGS, PURPOSES, AND POLICY 16 U.S.C. 1801

(a) FINDINGS.–The Congress finds and declares the following:

(1) The fish off the coasts of the United States, the highly migratory species of the high seas, the species which dwell on or in the Continental Shelf appertaining to the United States, and the anadromous species which spawn in United States rivers or estuaries, constitute valuable and renewable natural resources. These fishery resources contribute to the food supply, economy, and health of the Nation and provide recreational opportunities.

-297

(2) Certain stocks of fish have declined to the point where their survival is threatened, and other stocks of fish have been so substantially reduced in number that they could become similarly threatened as a consequence of (A) increased fishing pressure, (B) the inadequacy of fishery resource conservation and management practices and controls, or (C) direct and indirect habitat losses which have resulted in a diminished capacity to support existing fishing levels.

(3) Commercial and recreational fishing constitutes a major source of employment and contributes significantly to the economy of the Nation. Many coastal areas are dependent upon fishing and related activities, and their economies have been badly damaged by the overfishing of fishery resources at an ever-increasing rate over the past decade. The activities of massive foreign fishing fleets in waters adjacent to such coastal areas have contributed to such damage, interfered with domestic fishing efforts, and caused destruction of the fishing gear of United States fishermen.

(4) International fishery agreements have not been effective in preventing or terminating the overfishing of these valuable fishery resources. There is danger that irreversible effects from overfishing will take place before an effective international agreement on fishery management jurisdiction can be negotiated, signed, ratified, and implemented.

(5) Fishery resources are finite but renewable. If placed under sound management before overfishing has caused irreversible effects, the fisheries can be conserved and maintained so as to provide optimum yields on a continuing basis.

-297

(6) A national program for the conservation and management of the fishery resources of the United States is necessary to prevent overfishing, to rebuild overfished stocks, to insure conservation, to facilitate long-term protection of essential fish habitats, and to realize the full potential of the Nation's fishery resources.

354

(7) A national program for the development of fisheries which are underutilized or not utilized by the United States fishing industry, including bottom fish off Alaska, is necessary to assure that our citizens benefit from the employment, food supply, and revenue which could be generated thereby.

-627

(8) The collection of reliable data is essential to the effective conservation, management, and scientific understanding of the fishery resources of the United States.

104-297

(9) One of the greatest long-term threats to the viability of commercial and recreational fisheries is the continuing loss of marine, estuarine, and other aquatic habitats. Habitat considerations should receive increased attention for the conservation and management of fishery resources of the United States.

104-297

(10) Pacific Insular Areas contain unique historical, cultural, legal, political, and geographical circumstances which make fisheries resources important in sustaining their economic growth.

(b) PURPOSES.--It is therefore declared to be the purposes of the Congress in this Act--

99-659, 101-627, 102-251

(1) to take immediate action to conserve and manage the fishery resources found off the coasts of the United States, and the anadromous species and Continental Shelf fishery resources of the United States, by exercising (A) sovereign rights for the purposes of exploring, exploiting, conserving, and managing all fish within the exclusive economic zone established by Presidential Proclamation 5030, dated March 10, 1983, and (B) exclusive fishery management authority beyond the exclusive economic zone over such anadromous species and Continental Shelf fishery resources[, and fishery resources in the special areas]*;

(2) to support and encourage the implementation and enforcement of international fishery agreements for the conservation and management of highly migratory species, and to encourage the negotiation and implementation of additional such agreements as necessary;

104-297

(3) to promote domestic commercial and recreational fishing under sound conservation and management principles, including the promotion of catch and release programs in recreational fishing;

(4) to provide for the preparation and implementation, in accordance with national standards, of fishery management plans which will achieve and maintain, on a continuing basis, the optimum yield from each fishery;

101-627

(5) to establish Regional Fishery Management Councils to exercise sound judgment in the stewardship of fishery resources through the preparation, monitoring, and revision of such plans under circumstances (A) which will enable the States, the fishing industry, consumer and environmental organizations, and other interested persons to participate in, and advise on, the establishment and administration of such plans, and (B) which take into account the social and economic needs of the States;

354, 96-561, 104-297

(6) to encourage the development by the United States fishing industry of fisheries which are currently underutilized or not utilized by United States fishermen, including bottom fish off Alaska, and to that end, to ensure that optimum yield determinations promote such development in a non-wasteful manner; and

-297

(7) to promote the protection of essential fish habitat in the review of projects conducted under Federal permits, licenses, or other authorities that affect or have the potential to affect such habitat.

(c) POLICY.--It is further declared to be the policy of the Congress in this Act--

(1) to maintain without change the existing territorial or other ocean jurisdiction of the United States for all purposes other than the conservation and management of fishery resources, as provided for in this Act;

(2) to authorize no impediment to, or interference with, recognized legitimate uses of the high seas, except as necessary for the conservation and management of fishery resources, as provided for in this Act;

-627, 104-297

(3) to assure that the national fishery conservation and management program utilizes, and is based upon, the best scientific information available; involves, and is responsive to the needs of, interested and affected States and citizens; considers efficiency; draws upon Federal, State, and academic capabilities in carrying out research, administration, management, and enforcement; considers the effects of fishing on immature fish and encourages development of practical measures that minimize bycatch and avoid unnecessary waste of fish; and is workable and effective;

(4) to permit foreign fishing consistent with the provisions of this Act;

59, 101-627

(5) to support and encourage active United States efforts to obtain internationally acceptable agreements which provide for effective conservation and management of fishery resources, and to secure agreements to regulate fishing by vessels or persons beyond the exclusive economic zones of any nation;

627

(6) to foster and maintain the diversity of fisheries in the United States; and

297

(7) to ensure that the fishery resources adjacent to a Pacific Insular Area, including resident or migratory stocks within the exclusive economic zone adjacent to such areas, be explored, developed, conserved, and managed for the benefit of the people of such area and of the United States.

TITLE I -- UNITED STATES RIGHTS AND AUTHORITY REGARDING FISH AND FISHERY RESOURCES

SEC. 101. UNITED STATES SOVEREIGN RIGHTS TO FISH AND FISHERY MANAGEMENT AUTHORITY

16 U.S.C. 1811

99-659, 102-251

(a) IN THE EXCLUSIVE ECONOMIC ZONE.--Except as provided in section 102, the United States claims, and will exercise in the manner provided for in this Act, sovereign rights and exclusive fishery management authority over all fish, and all Continental Shelf fishery resources, within the exclusive economic zone [and special areas]*.

99-659, 101-627, 102-251

(b) BEYOND THE EXCLUSIVE ECONOMIC ZONE.--The United States claims, and will exercise in the manner provided for in this Act, exclusive fishery management authority over the following:

(1) All anadromous species throughout the migratory range of each such species beyond the exclusive economic zone; except that that management authority does not extend to any such species during the time they are found within any waters of a foreign nation.

(2) All Continental Shelf fishery resources beyond the exclusive economic zone.

[(3) All fishery resources in the special areas.]*

SEC. 102. HIGHLY MIGRATORY SPECIES

16 U.S.C. 1812

99-659, 101-627, 104-297

The United States shall cooperate directly or through appropriate international organizations with those nations involved in fisheries for highly migratory species with a view to ensuring conservation and shall promote the achievement of optimum yield of such species throughout their range, both within and beyond the exclusive economic zone.

LE III -- NATIONAL FISHERY MANAGEMENT PROGRAM

C. 301. NATIONAL STANDARDS FOR FISHERY CONSERVATION AND MANAGEMENT 16 U.S.C. 1851

(a) IN GENERAL.--Any fishery management plan prepared, and any regulation promulgated nplement any such plan, pursuant to this title shall be consistent with the following national dards for fishery conservation and management:

623

(1) Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

(2) Conservation and management measures shall be based upon the best scientific information available.

(3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

(4) Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

-297

(5) Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

(6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

(7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

-297

(8) Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

-297

(9) Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of

LE I -- UNITED STATES RIGHTS AND AUTHORITY REGARDING FISH AND FISHERY RESOURCES

. 101. UNITED STATES SOVEREIGN RIGHTS TO FISH AND FISHERY MANAGEMENT AUTHORITY 16 U.S.C. 1811

59, 102-251

(a) IN THE EXCLUSIVE ECONOMIC ZONE.--Except as provided in section 102, the ed States claims, and will exercise in the manner provided for in this Act, sovereign rights and usive fishery management authority over all fish, and all Continental Shelf fishery resources, within xclusive economic zone [and special areas]*.

59, 101-627, 102-251

(b) BEYOND THE EXCLUSIVE ECONOMIC ZONE.--The United States claims, and exercise in the manner provided for in this Act, exclusive fishery management authority over the wing:

(1) All anadromous species throughout the migratory range of each such species beyond the exclusive economic zone; except that that management authority does not extend to any such species during the time they are found within any waters of a foreign nation.

(2) All Continental Shelf fishery resources beyond the exclusive economic zone.

[(3) All fishery resources in the special areas.]*

. 102. HIGHLY MIGRATORY SPECIES 16 U.S.C. 1812

59, 101-627, 104-297

United States shall cooperate directly or through appropriate international organizations with those ons involved in fisheries for highly migratory species with a view to ensuring conservation and shall note the achievement of optimum yield of such species throughout their range, both within and ond the exclusive economic zone.

such bycatch.

-297

(10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

53

(b) GUIDELINES.-- The Secretary shall establish advisory guidelines (which shall not have the e and effect of law), based on the national standards, to assist in the development of fishery agement plans.

C. 302. REGIONAL FISHERY MANAGEMENT COUNCILS 16 U.S.C. 1852

-453, 101-627, 104-297

a) ESTABLISHMENT.--(1) There shall be established, within 120 days after the date of the actment of this Act, eight Regional Fishery Management Councils, as follows:

(A) NEW ENGLAND COUNCIL.--The New England Fishery Management Council shall consist of the States of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut and shall have authority over the fisheries in the Atlantic Ocean seaward of such States (except as provided in paragraph (3)). The New England Council shall have 17 voting members, including 11 appointed by the Secretary in accordance with subsection (b)(2) (at least one of whom shall be appointed from each such State).

(B) MID-ATLANTIC COUNCIL.--The Mid-Atlantic Fishery Management Council shall consist of the States of New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, and North Carolina and shall have authority over the fisheries in the Atlantic Ocean seaward of such States (except North Carolina, and as provided in paragraph (3)). The Mid-Atlantic Council shall have 21 voting members, including 13 appointed by the Secretary in accordance with subsection (b)(2) (at least one of whom shall be appointed from each such State).

(C) SOUTH ATLANTIC COUNCIL.--The South Atlantic Fishery Management Council shall consist of the States of North Carolina, South Carolina, Georgia, and Florida and shall have authority over the fisheries in the Atlantic Ocean seaward of such States (except as provided in paragraph (3)). The South Atlantic Council shall have 13 voting members, including 8 appointed by the Secretary in accordance with subsection (b)(2) (at least one of whom shall be appointed from each such State).

(D) CARIBBEAN COUNCIL.--The Caribbean Fishery Management Council shall consist of the Virgin Islands and the Commonwealth of Puerto Rico and shall have authority over the fisheries in the Caribbean Sea and Atlantic Ocean seaward of such States (except as provided in paragraph (3)). The Caribbean Council shall have 7 voting members, including 4 appointed by the Secretary in accordance with subsection (b)(2) (at least one of whom shall be appointed from each such State).

(E) GULF COUNCIL.--The Gulf of Mexico Fishery Management Council shall consist of the States of Texas, Louisiana, Mississippi, Alabama, and Florida and shall have authority over the fisheries in the Gulf of Mexico seaward of such States (except as provided in paragraph (3)). The Gulf Council shall have 17 voting members, including 11 appointed by the Secretary in accordance with subsection (b)(2) (at least one of whom shall be appointed from each such State).

(F) PACIFIC COUNCIL.--The Pacific Fishery Management Council shall consist of the States of California, Oregon, Washington, and Idaho and shall have authority over the fisheries in the Pacific Ocean seaward of such States. The Pacific Council shall have 14 voting members, including 8 appointed by the Secretary in accordance with subsection (b)(2) (at least one of whom shall be appointed from each such State), and including one appointed from an Indian tribe with Federally recognized fishing rights from California, Oregon, Washington, or Idaho in accordance with subsection (b)(5).

(G) NORTH PACIFIC COUNCIL.--The North Pacific Fishery Managemen Council shall consist of the States of Alaska, Washington, and Oregon and shall have authority over the fisheries in the Arctic Ocean, Bering Sea, and Pacific Ocean seaward of Alaska. The North Pacific Council shall have 11 voting members, including 7 appointed by the Secretary in accordance with subsection (b)(2) (5 of whom shall be appointed from the State of Alaska and 2 of whom shall be appointed from the State of Washington).

(H) WESTERN PACIFIC COUNCIL.--The Western Pacific Fishery Management Council shall consist of the States of Hawaii, American Samoa, Guam, an the Northern Mariana Islands and shall have authority over the fisheries in the Pacific Ocean seaward of such States and of the Commonwealths, territories, and possessions o the United States in the Pacific Ocean area. The Western Pacific Council shall have 13 voting members, including 8 appointed by the Secretary in accordance with subsection (b)(2) (at least one of whom shall be appointed from each of the following States: Hawaii, American Samoa, Guam, and the Northern Mariana Islands).

(2) Each Council shall reflect the expertise and interest of the several constituent States in the ocean area over which such Council is granted authority.

(3) The Secretary shall have authority over any highly migratory species fishery that is within the geographical area of authority of more than one of the following Councils: New England Council, Mid-Atlantic Council, South Atlantic Council, Gulf Council, and Caribbean Council.

97-453, 99-659, 101-627, 102-582, 104-297

(b) VOTING MEMBERS.--

(1) The voting members of each Council shall be:

(A) The principal State official with marine fishery management responsibility and expertise in each constituent State, who is designated as such by the Governor of the State, so long as the official continues to hold such position, or the designee of such official.

(B) The regional director of the National Marine Fisheries Service for the geographic area concerned, or his designee, except that if two such directors are within such geographical area, the Secretary shall designate which of such directors shall be the voting member.

(C) The members required to be appointed by the Secretary in accordance with paragraphs (2) and (5).

(2) (A) The members of each Council required to be appointed by the Secretary must be individuals who, by reason of their occupational or other experience, scientific expertise, or training, are knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources of the geographical area concerned. Within nine months after the date of enactment of the Fishery Conservation Amendments of 1990, the Secretary shall, by regulation, prescribe criteria for determining whether an individual satisfies the requirements of this subparagraph.

(B) The Secretary, in making appointments under this section, shall, to the extent practicable, ensure a fair and balanced apportionment, on a rotating or other basis, of the active participants (or their representatives) in the commercial and recreational fisheries under the jurisdiction of the Council. On January 31, 1991, and each year thereafter, the Secretary shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Merchant Marine and Fisheries of the House of Representatives a report on the actions taken by the Secretary to ensure that such fair and balanced apportionment is achieved. The report shall--

(i) list the fisheries under the jurisdiction of each Council, outlining for fishery the type and quantity of fish harvested, fishing and processing methods employed, the number of participants, the duration and range of the fishery, and other distinguishing characteristics;

(ii) assess the membership of each Council in terms of the active participants in each such fishery; and

(iii) state the Secretary's plans and schedule for actions to achieve a fair balanced apportionment on the Council for the active participants in any such fishery.

(C) The Secretary shall appoint the members of each Council from a list of individuals submitted by the Governor of each applicable constituent State. A Governo may not submit the names of individuals to the Secretary for appointment unless the Governor has determined that each such individual is qualified under the requirements o subparagraph (A) and unless the Governor has, to the extent practicable, first consulted with representatives of the commercial and recreational fishing interests of the State regarding those individuals. Each such list shall include the names and pertinent biographical data of not less than three individuals for each applicable vacancy and shal be accompanied by a statement by the Governor explaining how each such individual meets the requirements of subparagraph (A). The Secretary shall review each list submitted by a Governor to ascertain if the individuals on the list are qualified for the vacancy on the basis of such requirements. If the Secretary determines that any individual is not qualified, the Secretary shall notify the appropriate Governor of that determination. The Governor shall then submit a revised list or resubmit the original lis with an additional explanation of the qualifications of the individual in question. An individual is not eligible for appointment by the Secretary until that individual complies with the applicable financial disclosure requirements under subsection (k).

(D) Whenever the Secretary makes an appointment to a Council, the Secretary shall make a public announcement of such appointment not less than 45 days before the first day on which the individual is to take office as a member of the Council.

(3) Each voting member appointed to a Council by the Secretary in accordance with paragraphs (2) and (5) shall serve for a term of 3 years; except that the Secretary may designate shorter term if necessary to provide for balanced expiration to terms of office. No member appointed after January 1, 1986, may serve more than three consecutive terms. Any term in which an individual was appointed to replace a member who left office during the term shall not be counted in determining the number of consecutive terms served by that Council member.

(4) Successors to the voting members of any Council shall be appointed in the same manner as the original voting members. Any individual appointed to fill a vacancy occurring prior to the expiration of any term of office shall be appointed for the remainder of that term.

(5) (A) The Secretary shall appoint to the Pacific Council one representative of an India tribe with Federally recognized fishing rights from California, Oregon, Washington, or Idaho from a list of not less than 3 individuals submitted by the tribal governments. The Secretary, in consultation with the Secretary of the Interior and tribal governments, shall establish by regulation the procedure for submitting a list under this subparagraph.

(B) Representation shall be rotated among the tribes taking into consideration--

(i) the qualifications of the individuals on the list referred to in subparagraph (A),

(ii) the various rights of the Indian tribes involved and judicial cases tha set forth how those rights are to be exercised, and

(iii) the geographic area in which the tribe of the representative is located.

(C) A vacancy occurring prior to the expiration of any term shall be filled in the same manner as set out in subparagraphs (A) and (B), except that the Secretary may use the list from which the vacating representative was chosen.

(6) The Secretary may remove for cause any member of a Council required to be appointed by the Secretary in accordance with paragraphs (2) or (5) if--

(A) the Council concerned first recommends removal by not less than two-thirds of the members who are voting members and submits such removal recommendation to the Secretary in writing together with a statement of the basis for the recommendation; or

(B) the member is found by the Secretary, after notice and an opportunity for a hearing in accordance with section 554 of title 5, United States Code, to have committed an act prohibited by section 307(1)(O).

(c) NONVOTING MEMBERS.--

(1) The nonvoting members of each Council shall be:

(A) The regional or area director of the United States Fish and Wildlife Service for the geographical area concerned, or his designee.

(B) The commander of the Coast Guard district for the geographical area concerned, or his designee; except that, if two Coast Guard districts are within such geographical area, the commander designated for such purpose by the commandant of the Coast Guard.

(C) The Executive Director of the Marine Fisheries Commission for the geographical area concerned, if any, or his designee.

(D) One representative of the Department of State designated for such purpose by the Secretary of State, or his designee.

(2) The Pacific Council shall have one additional nonvoting member who shall be appointed by, and serve at the pleasure of, the Governor of Alaska.

-561, 101-627, 104-297

(d) COMPENSATION AND EXPENSES.--The voting members of each Council who are uired to be appointed by the Secretary and who are not employed by the Federal Government or any te or local government, shall receive compensation at the daily rate for GS-15, step 7 of the General hedule, when engaged in the actual performance of duties for such Council. The voting members of h Council, any nonvoting member described in subsection (c)(1)(C), and the nonvoting member pointed pursuant to subsection (c)(2) shall be reimbursed for actual expenses incurred in the formance of such duties, and other nonvoting members and Council staff members may be mbursed for actual expenses.

1-627

(e) TRANSACTION OF BUSINESS.--

(1) A majority of the voting members of any Council shall constitute a quorum, but one or more such members designated by the Council may hold hearings. All decisions of any Council shall be by majority vote of the voting members present and voting.

(2) The voting members of each Council shall select a Chairman for such Council from among the voting members.

(3) Each Council shall meet at appropriate times and places in any of the constituent States of the Council at the call of the Chairman or upon the request of a majority of its voting members.

(4) If any voting member of a Council disagrees with respect to any matter which is transmitted to the Secretary by such Council, such member may submit a statement to the Secretary setting forth the reasons for such disagreement. The regional director of the National Marine Fisheries Service serving on the Council, or the regional director's designee, shall submit such a statement, which shall be made available to the public upon request, if the regional director disagrees with any such matter.

104-297

(5) At the request of any voting member of a Council, the Council shall hold a roll call vote on any matter before the Council. The official minutes and other appropriate records of any Council meeting shall identify all roll call votes held, the name of each voting member present during each roll call vote, and how each member voted on each roll call vote.

97-453

(f) STAFF AND ADMINISTRATION.--

(1) Each Council may appoint, and assign duties to, an executive director and such other full- and part-time administrative employees as the Secretary determines are necessary to the performance of its functions.

(2) Upon the request of any Council, and after consultation with the Secretary, the head of any Federal agency is authorized to detail to such Council, on a reimbursable basis, any of the personnel of such agency, to assist such Council in the performance of its functions under this Act.

(3) The Secretary shall provide to each Council such administrative and technical support services as are necessary for the effective functioning of such Council.

(4) The Administrator of General Services shall furnish each Council with such offices, equipment, supplies, and services as he is authorized to furnish to any other agency or instrumentality of the United States.

(5) The Secretary and the Secretary of State shall furnish each Council with relevant information concerning foreign fishing and international fishery agreements.

(6) Each Council shall determine its organization, and prescribe its practices and procedures for carrying out its functions under this Act, in accordance with such uniform standards as are prescribed by the Secretary. The procedures of a Council, and of its scientific and statistical committee and advisory panels established under subsection (g), must be consistent with the procedural guidelines set forth in subsection [j](2). Each Council shall

publish and make available to the public a statement of its organization, practices, and procedures.

(7) The Secretary shall pay--

(A) the compensation and expenses provided for in subsection (d);

(B) appropriate compensation to employees appointed under paragraph (1);

(C) the amounts required for reimbursement of other Federal agencies under paragraphs (2) and (4);

(D) the actual expenses of the members of the committees and panels established under subsection (g); and

(E) such other costs as the Secretary determines are necessary to the performance of the functions of the Councils.

-627

(g) COMMITTEES AND PANELS.--

(1) Each Council shall establish and maintain, and appoint the members of, a scientific and statistical committee to assist it in the development, collection, and evaluation of such statistical, biological, economic, social, and other scientific information as is relevant to such Council's development and amendment of any fishery management plan.

(2) Each Council shall establish such other advisory panels as are necessary or appropriate to assist it in carrying out its functions under this Act.

(3) (A) Each Council shall establish and maintain a fishing industry advisory committee which shall provide information and recommendations on, and assist in the development of, fishery management plans and amendments to such plans.

(B) Appointments to a committee established under subparagraph (A) shall be made by each Council in such a manner as to provide fair representation to commercial fishing interests in the geographical area of authority of the Council.

-297

(4) The Secretary shall establish advisory panels to assist in the collection and evaluation of information relevant to the development of any fishery management plan or plan amendment for a fishery to which subsection (a)(3) applies. Each advisory panel shall participate in all aspects of the development of the plan or amendment; be balanced in its representation of commercial, recreational, and other interests; and consist of not less than 7 individuals who are knowledgeable about the fishery for which the plan or amendment is developed, selected from among--

(A) members of advisory committees and species working groups appointed under Acts implementing relevant international fishery agreements pertaining to highly migratory species; and

(B) other interested persons.

(5) Decisions and recommendations made by committees and panels established under this subsection shall be considered to be advisory in nature.

95-354, 97-453, 101-627

(h) FUNCTIONS.--Each Council shall, in accordance with the provisions of this Act--

104-297

(1) for each fishery under its authority that requires conservation and management, prepare and submit to the Secretary (A) a fishery management plan, and (B) amendments to each such plan that are necessary from time to time (and promptly whenever changes in conservation and management measures in another fishery substantially affect the fishery for which such plan was developed);

104-297

(2) prepare comments on any application for foreign fishing transmitted to it under section 204(b)(4)(C) or section 204(d), and any fishery management plan or amendment transmitted to it under section 304(c)(4);

(3) conduct public hearings, at appropriate times and in appropriate locations in the geographical area concerned, so as to allow all interested persons an opportunity to be heard in the development of fishery management plans and amendments to such plans, and with respect to the administration and implementation of the provisions of this Act (and for purposes of this paragraph, the term "geographical area concerned" may include an area under the authority of another Council if the fish in the fishery concerned migrate into, or occur in, that area or if the matters being heard affect fishermen of that area; but not unless such other Council is first consulted regarding the conduct of such hearings within its area);

(4) submit to the Secretary such periodic reports as the Council deems appropriate, and any other relevant report which may be requested by the Secretary;

104-297

(5) review on a continuing basis, and revise as appropriate, the assessments and specifications made pursuant to section 303(a)(3) and (4) with respect to the optimum yield from, the capacity and extent to which United States fish processors will process United States harvested fish from, and the total allowable level of foreign fishing in, each fishery (except as provided in section subsection (a)(3)) within its geographical area of authority; and

(6) conduct any other activities which are required by, or provided for in, this Act or which are necessary and appropriate to the foregoing functions.

97-453, 99-659, 101-627

(i) PROCEDURAL MATTERS.--

(1) The Federal Advisory Committee Act (5 U.S.C. App. 2) shall not apply to the Councils or to the scientific and statistical committees or advisory panels established under subsection (g).

104-297

(2) The following guidelines apply with respect to the conduct of business at meetings of a Council, and of the scientific and statistical committee and advisory panels established under

subsection (g).

(A) Unless closed in accordance with paragraph (3), each regular meeting and each emergency meeting shall be open to the public.

(B) Emergency meetings shall be held at the call of the chairman or equivalent presiding officer.

(C) Timely public notice of each regular meeting and each emergency meeting, including the time, place, and agenda of the meeting, shall be published in local newspapers in the major fishing ports of the region (and in other major fishing ports having a direct interest in the affected fishery) and such notice may be given by such other means as will result in wide publicity. Timely notice of each regular meeting shall also be published in the Federal Register. The published agenda of the meeting may not be modified to include additional matters for Council action without public notice or within 14 days prior to the meeting date, unless such modification is to address an emergency action under section 305(c), in which case public notice shall be given immediately.

(D) Interested persons shall be permitted to present oral or written statements regarding the matters on the agenda at meetings. All written information submitted to a Council by an interested person shall include a statement of the source and date of such information. Any oral or written statement shall include a brief description of the background and interests of the person in the subject of the oral or written statement.

(E) Detailed minutes of each meeting of the Council, except for any closed session, shall be kept and shall contain a record of the persons present, a complete and accurate description of matters discussed and conclusions reached, and copies of all statements filed. The Chairman shall certify the accuracy of the minutes of each such meeting and submit a copy thereof to the Secretary. The minutes shall be made available to any court of competent jurisdiction.

(F) Subject to the procedures established under paragraph (4), and the guidelines prescribed by the Secretary under section 402(b), relating to confidentiality, the administrative record, including minutes required under subparagraph (E), of each meeting, and records or other documents which were made available to or prepared for or by the Council, committee, or panel incident to the meeting, shall be available for public inspection and copying at a single location in the offices of the Council or the Secretary, as appropriate.

(3) (A) Each Council, scientific and statistical committee, and advisory panel--

(i) shall close any meeting, or portion thereof, that concerns matters or information that bears a national security classification; and

(ii) may close any meeting, or portion thereof, that concerns matters or information that pertains to national security, employment matters, or briefings on litigation in which the Council is interested; and

(B) If any meeting or portion is closed, the Council concerned shall notify local newspapers in the major fishing ports within its region (and in other major, affected fishing ports), including in that notification the time and place of the meeting. This subparagraph does not require notification regarding any brief closure of a portion of a meeting in order to discuss employment or other internal administrative matters. Subparagraphs (D) and (F) of paragraph (2) shall not apply to any meeting or portion thereof that is so closed.

(4) Each Council shall establish appropriate procedures applicable to it and to its committee and advisory panels for ensuring confidentiality of the statistics that may be submitted to it by Federal or State authorities, and may be voluntarily submitted to it by private persons; including, but not limited to, procedures for the restriction of Council employee access and the prevention of conflicts of interest; except that such procedures, in the case of statistics submitted to the Council by a State or by the Secretary under section 402(b), must be consistent with the laws and regulations of that State, or with the procedures of the Secretary, as the case may be, concerning the confidentiality of the statistics.

(5) Each Council shall specify those procedures that are necessary or appropriate to ensure that the committees and advisory panels established under subsection (g) are involved, on a continuing basis, in the development and amendment of fishery management plans.

(6) At any time when a Council determines it appropriate to consider new information from a State or Federal agency or from a Council advisory body, the Council shall give comparable consideration to new information offered at that time by interested members of the public. Interested parties shall have a reasonable opportunity to respond to new data or information before the Council takes final action on conservation and management measures.

99-659, 104-297

(j) DISCLOSURE OF FINANCIAL INTEREST AND RECUSAL.--

104-297

(1) For the purposes of this subsection--
  (A) the term "affected individual" means an individual who--
    (i) is nominated by the Governor of a State for appointment as a voting member of a Council in accordance with subsection (b)(2); or
    (ii) is a voting member of a Council appointed--
      (I) under subsection (b)(2); or
      (II) under subsection (b)(5) who is not subject to disclosure and recusal requirements under the laws of an Indian tribal government; and
  (B) the term "designated official" means a person with expertise in Federal conflict-of-interest requirements who is designated by the Secretary, in consultation with the Council, to attend Council meetings and make determinations under paragraph (7)(B).

(2) Each affected individual must disclose any financial interest held by--
  (A) that individual;

(B) the spouse, minor child, or partner of that individual; and

(C) any organization (other than the Council) in which that individual is serving an officer, director, trustee, partner, or employee;

in any harvesting, processing, or marketing activity that is being, or will be, undertaken within any fishery over which the Council concerned has jurisdiction.

-297

(3) The disclosure required under paragraph (2) shall be made--

(A) in the case of an affected individual referred to in paragraph (1)(A)(i), before appointment by the Secretary; and

(B) in the case of an affected individual referred to in paragraph (1)(A)(ii), within 45 days of taking office.

-297

(4) An affected individual referred to in paragraph (1)(A)(ii) must update his or her disclosure form at any time any such financial interest is acquired, or substantially changed, by any person referred to in paragraph (2)(A), (B), or (C).

-297

(5) The financial interest disclosures required by this subsection shall--

(A) be made on such forms, in accordance with such procedures, and at such

es, as the Secretary shall by regulation prescribe;

(B) be kept on file, and made available for public inspection at reasonable hours, the Council offices; and

(C) be kept on file by the Secretary for use in reviewing determinations under paragraph 7(B) and made available for public inspection at reasonable hours.

-297

(6) The participation by an affected individual referred to in paragraph (1)(A)(ii) in an action by a Council during any time in which that individual is not in compliance with the regulations prescribed under paragraph (5) may not be treated as cause for the invalidation of that action.

-297

(7) (A) After the effective date of regulations promulgated under subparagraph (F) of this paragraph, an affected individual required to disclose a financial interest under paragraph (2) shall not vote on a Council decision which would have a significant and predictable effect on such financial interest. A Council decision shall be considered to have a significant and predictable effect on a financial interest if there is a close causal link between the Council decision and an expected and substantially disproportionate benefit to the financial interest of the affected individual relative to the financial interests of other participants in the same gear type or sector of the fishery. An affected individual who may not vote may participate in Council deliberations relating to the decision after notifying the Council of the voting recusal and identifying the financial interest that would be affected.

(B) At the request of an affected individual, or upon the initiative of the appropriate designated official, the designated official shall make a determination for th record whether a Council decision would have a significant and predictable effect on a financial interest.

(C) Any Council member may submit a written request to the Secretary to review any determination by the designated official under subparagraph (B) within 10 days of such determination. Such review shall be completed within 30 days of receipt o the request.

(D) Any affected individual who does not vote in a Council decision in accordance with this subsection may state for the record how he or she would have vote on such decision if he or she had voted.

(E) If the Council makes a decision before the Secretary has reviewed a determination under subparagraph (C), the eventual ruling may not be treated as cause for the invalidation or reconsideration by the Secretary of such decision.

(F) The Secretary, in consultation with the Councils and by not later than one year from the date of enactment of the Sustainable Fisheries Act, shall promulgate regulations which prohibit an affected individual from voting in accordance with subparagraph (A), and which allow for the making of determinations under subparagraphs (B) and (C).

104-297

(8) Section 208 of title 18, United States Code, does not apply to an affected individual referred to in paragraph (1)(A)(ii) during any time in which that individual is in compliance with the regulations prescribed under paragraph (5).

SEC. 303. CONTENTS OF FISHERY MANAGEMENT PLANS 16 U.S.C. 185

95-354, 99-659, 101-627, 104-297

(a) REQUIRED PROVISIONS.--Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, shall--

(1) contain the conservation and management measures, applicable to foreign fishing an fishing by vessels of the United States, which are--

(A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery;

(B) described in this subsection or subsection (b), or both; and

(C) consistent with the national standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;

(2) contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;

(3) assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

(4) assess and specify--

(A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3),

(B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and

(C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;

(5) specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;

(6) consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

(7) describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;

(8) in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

(9) include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and describe the likely effects, if any, of the conservation and managemen measures on--

(A) participants in the fisheries and fishing communities affected by the plan or amendment; and

(B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to preven overfishing or end overfishing and rebuild the fishery;

(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to th extent practicable and in the following priority--

(A) minimize bycatch; and

(B) minimize the mortality of bycatch which cannot be avoided;

(12) assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;

(13) include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors; and

(14) to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

97-453, 99-659, 101-627, 102-251, 104-297

(b) DISCRETIONARY PROVISIONS.--Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, may--

(1) require a permit to be obtained from, and fees to be paid to, the Secretary, with respect to--

(A) any fishing vessel of the United States fishing, or wishing to fish, in the exclusive economic zone [or special areas,]* or for anadromous species or Continental Shelf fishery resources beyond such zone [or areas]*;

(B) the operator of any such vessel; or

(C) any United States fish processor who first receives fish that are subject to the plan;

(2) designate zones where, and periods when, fishing shall be limited, or shall not be permitted, or shall be permitted only by specified types of fishing vessels or with specified types and quantities of fishing gear;

(3) establish specified limitations which are necessary and appropriate for the conservation and management of the fishery on the--

(A) catch of fish (based on area, species, size, number, weight, sex, bycatch, total biomass, or other factors);

(B) sale of fish caught during commercial, recreational, or charter fishing, consistent with any applicable Federal and State safety and quality requirements; and

(C) transshipment or transportation of fish or fish products under permits issued pursuant to section 204;

(4) prohibit, limit, condition, or require the use of specified types and quantities of fishing gear, fishing vessels, or equipment for such vessels, including devices which may be required to facilitate enforcement of the provisions of this Act;

(5) incorporate (consistent with the national standards, the other provisions of this Act, and any other applicable law) the relevant fishery conservation and management measures of the coastal States nearest to the fishery;

(6) establish a limited access system for the fishery in order to achieve optimum yield if, in developing such system, the Council and the Secretary take into account--

(A) present participation in the fishery,

(B) historical fishing practices in, and dependence on, the fishery,

(C) the economics of the fishery,

(D) the capability of fishing vessels used in the fishery to engage in other ries,

(E) the cultural and social framework relevant to the fishery and any affected fishing communities, and

(F) any other relevant considerations;

(7) require fish processors who first receive fish that are subject to the plan to submit data (other than economic data) which are necessary for the conservation and management of the fishery;

(8) require that one or more observers be carried on board a vessel of the United States engaged in fishing for species that are subject to the plan, for the purpose of collecting data necessary for the conservation and management of the fishery; except that such a vessel shall not be required to carry an observer on board if the facilities of the vessel for the quartering of an observer, or for carrying out observer functions, are so inadequate or unsafe that the health or safety of the observer or the safe operation of the vessel would be jeopardized;

(9) assess and specify the effect which the conservation and management measures of the plan will have on the stocks of naturally spawning anadromous fish in the region;

(10) include, consistent with the other provisions of this Act, conservation and management measures that provide harvest incentives for participants within each gear group to employ fishing practices that result in lower levels of bycatch or in lower levels of the mortality of bycatch;

(11) reserve a portion of the allowable biological catch of the fishery for use in scientific research; and

(12) prescribe such other measures, requirements, or conditions and restrictions as are determined to be necessary and appropriate for the conservation and management of the fishery.

97-453, 104-297

(c) PROPOSED REGULATIONS.--Proposed regulations which the Council deems necessary or appropriate for the purposes of--

(1) implementing a fishery management plan or plan amendment shall be submitted to the Secretary simultaneously with the plan or amendment under section 304; and

(2) making modifications to regulations implementing a fishery management plan or plan amendment may be submitted to the Secretary at any time after the plan or amendment is approved under section 304.

104-297

(d) INDIVIDUAL FISHING QUOTAS.--

(1) (A) A Council may not submit and the Secretary may not approve or implement before October 1, 2000, any fishery management plan, plan amendment, or regulation under this Act which creates a new individual fishing quota program.

(B) Any fishery management plan, plan amendment, or regulation approved by the Secretary on or after January 4, 1995, which creates any new individual fishing quota program shall be repealed and immediately returned by the Secretary to the appropriate Council and shall not be resubmitted, reapproved, or implemented during the moratorium set forth in subparagraph (A).

(2) (A) No provision of law shall be construed to limit the authority of a Council to submit and the Secretary to approve the termination or limitation, without compensation to holders of any limited access system permits, of a fishery management plan, plan amendment, or regulation that provides for a limited access system, including an individual fishing quota program.

(B) This subsection shall not be construed to prohibit a Council from submitting, or the Secretary from approving and implementing, amendments to the North Pacific halibut and sablefish, South Atlantic wreckfish, or Mid-Atlantic surf clam and ocean (including mahogany) quahog individual fishing quota programs.

(3) An individual fishing quota or other limited access system authorization--

(A) shall be considered a permit for the purposes of sections 307, 308, and 309;

(B) may be revoked or limited at any time in accordance with this Act;

(C) shall not confer any right of compensation to the holder of such individual fishing quota or other such limited access system authorization if it is revoked or limited; and

(D) shall not create, or be construed to create, any right, title, or interest in or to any fish before the fish is harvested.

(4) (A) A Council may submit, and the Secretary may approve and implement, a program which reserves up to 25 percent of any fees collected from a fishery under section 304(d)(2) to be used, pursuant to section 1104A(a)(7) of the Merchant Marine Act, 1936 (46 U.S.C. App. 1274(a)(7)), to issue obligations that aid in financing the--

(i) purchase of individual fishing quotas in that fishery by fishermen who fish from small vessels; and

(ii) first-time purchase of individual fishing quotas in that fishery by entry level fishermen.

(B) A Council making a submission under subparagraph (A) shall recommend criteria, consistent with the provisions of this Act, that a fisherman must meet to qualify for guarantees under clauses (i) and (ii) of subparagraph (A) and the portion of funds to be allocated for guarantees under each clause.

(5) In submitting and approving any new individual fishing quota program on or after October 1, 2000, the Councils and the Secretary shall consider the report of the National Academy of Sciences required under section 108(f) of the Sustainable Fisheries Act, and any recommendations contained in such report, and shall ensure that any such program--

(A) establishes procedures and requirements for the review and revision of the terms of any such program (including any revisions that may be necessary once a national policy with respect to individual fishing quota programs is implemented), and, if appropriate, for the renewal, reallocation, or reissuance of individual fishing quotas;

(B) provides for the effective enforcement and management of any such program, including adequate observer coverage, and for fees under section 304(d)(2) to recover actual costs directly related to such enforcement and management; and

(C) provides for a fair and equitable initial allocation of individual fishing quotas, prevents any person from acquiring an excessive share of the individual fishing quotas issued, and considers the allocation of a portion of the annual harvest in the fishery for entry-level fishermen, small vessel owners, and crew members who do not hold or qualify for individual fishing quotas.

297, sec. 108(b), M-S Act § 303 note

LEMENTATION.--Not later than 24 months after the date of enactment of this Act [P.L. 104-297], each onal Fishery Management Council shall submit to the Secretary of Commerce amendments to each fishery agement plan under its authority to comply with the amendments made in subsection (a) of this section [i.e., the 104-297 revisions to § 303(a)(1), (5), (7), and (9), and the addition of § 303(a)(10)-(14)].

297, sec. 108(i), M-S Act § 303 note

EXISTING QUOTA PLANS.--Nothing in this Act [P.L.104-297] or the amendments made by this Act shall be construed to require a reallocation of individual fishing quotas under any individual fishing quota program approv by the Secretary before January 4, 1995.

SEC. 304. ACTION BY THE SECRETARY

16 U.S.C. 185

104-297

(a) REVIEW OF PLANS.--

(1) Upon transmittal by the Council to the Secretary of a fishery management plan or plan amendment, the Secretary shall--

(A) immediately commence a review of the plan or amendment to determine whether it is consistent with the national standards, the other provisions of this Act, and any other applicable law; and

(B) immediately publish in the Federal Register a notice stating that the plan or amendment is available and that written information, views, or comments of interested persons on the plan or amendment may be submitted to the Secretary during the 60-day period beginning on the date the notice is published.

(2) In undertaking the review required under paragraph (1), the Secretary shall--

(A) take into account the information, views, and comments received from interested persons;

(B) consult with the Secretary of State with respect to foreign fishing; and

(C) consult with the Secretary of the department in which the Coast Guard is operating with respect to enforcement at sea and to fishery access adjustments referred t in section 303(a)(6).

(3) The Secretary shall approve, disapprove, or partially approve a plan or amendment within 30 days of the end of the comment period under paragraph (1) by written notice to the Council. A notice of disapproval or partial approval shall specify--

(A) the applicable law with which the plan or amendment is inconsistent;

(B) the nature of such inconsistencies; and

(C) recommendations concerning the actions that could be taken by the Council to conform such plan or amendment to the requirements of applicable law.

If the Secretary does not notify a Council within 30 days of the end of the comment period of the approval, disapproval, or partial approval of a plan or amendment, then such plan or amendment shall take effect as if approved.

(4) If the Secretary disapproves or partially approves a plan or amendment, the Council may submit a revised plan or amendment to the Secretary for review under this subsection.

(5) For purposes of this subsection and subsection (b), the term "immediately" means on or before the 5th day after the day on which a Council transmits to the Secretary a fishery management plan, plan amendment, or proposed regulation that the Council characterizes as final.

7

(b) REVIEW OF REGULATIONS.--

(1) Upon transmittal by the Council to the Secretary of proposed regulations prepared under section 303(c), the Secretary shall immediately initiate an evaluation of the proposed regulations to determine whether they are consistent with the fishery management plan, plan amendment, this Act and other applicable law. Within 15 days of initiating such evaluation the Secretary shall make a determination and--

(A) if that determination is affirmative, the Secretary shall publish such regulations in the Federal Register, with such technical changes as may be necessary for clarity and an explanation of those changes, for a public comment period of 15 to 60 days; or

(B) if that determination is negative, the Secretary shall notify the Council in writing of the inconsistencies and provide recommendations on revisions that would make the proposed regulations consistent with the fishery management plan, plan amendment, this Act, and other applicable law.

(2) Upon receiving a notification under paragraph (1)(B), the Council may revise the proposed regulations and submit them to the Secretary for reevaluation under paragraph (1).

(3) The Secretary shall promulgate final regulations within 30 days after the end of the comment period under paragraph (1)(A). The Secretary shall consult with the Council before making any revisions to the proposed regulations, and must publish in the Federal Register an explanation of any differences between the proposed and final regulations.

, 99-659, 104-297

(c) PREPARATION AND REVIEW OF SECRETARIAL PLANS.--

(1) The Secretary may prepare a fishery management plan, with respect to any fishery, or any amendment to any such plan, in accordance with the national standards, the other provisions of this Act, and any other applicable law, if--

(A) the appropriate Council fails to develop and submit to the Secretary, after a reasonable period of time, a fishery management plan for such fishery, or any necessary amendment to such a plan, if such fishery requires conservation and management;

(B) the Secretary disapproves or partially disapproves any such plan or amendment, or disapproves a revised plan or amendment, and the Council involved fails to submit a revised or further revised plan or amendment; or

(C) the Secretary is given authority to prepare such plan or amendment under this section.

In preparing any such plan or amendment, the Secretary shall consult with the Secretary of State with respect to foreign fishing and with the Secretary of the department in which the Coast Guard is operating with respect to enforcement at sea. The Secretary shall also prepare such proposed regulations as he deems necessary or appropriate to carry out each plan or amendment prepared by him under this paragraph.

(2) In preparing any plan or amendment under this subsection, the Secretary shall--

(A) conduct public hearings, at appropriate times and locations in the geographical areas concerned, so as to allow interested persons an opportunity to be heard in the preparation and amendment of the plan and any regulations implementing the plan; and

(B) consult with the Secretary of State with respect to foreign fishing and with the Secretary of the department in which the Coast Guard is operating with respect to enforcement at sea.

(3) Notwithstanding paragraph (1) for a fishery under the authority of a Council, the Secretary may not include in any fishery management plan, or any amendment to any such plan, prepared by him, a provision establishing a limited access system, including any individual fishing quota program unless such system is first approved by a majority of the voting members, present and voting, of each appropriate Council.

(4) Whenever the Secretary prepares a fishery management plan or plan amendment under this section, the Secretary shall immediately--

(A) for a plan or amendment for a fishery under the authority of a Council, submit such plan or amendment to the appropriate Council for consideration and comment; and

(B) publish in the Federal Register a notice stating that the plan or amendment is available and that written information, views, or comments of interested persons on the plan or amendment may be submitted to the Secretary during the 60-day period beginning on the date the notice is published.

(5) Whenever a plan or amendment is submitted under paragraph (4)(A), the appropriate Council must submit its comments and recommendations, if any, regarding the plan or amendment to the Secretary before the close of the 60-day period referred to in paragraph (4)(B). After the close of such 60-day period, the Secretary, after taking into account any such comments and recommendations, as well as any views, information, or comments submitted under paragraph (4)(B), may adopt such plan or amendment.

(6) The Secretary may propose regulations in the Federal Register to implement any plan or amendment prepared by the Secretary. In the case of a plan or amendment to which paragraph (4)(A) applies, such regulations shall be submitted to the Council with such plan or amendment. The comment period on proposed regulations shall be 60 days, except that the Secretary may shorten the comment period on minor revisions to existing regulations.

(7) The Secretary shall promulgate final regulations within 30 days after the end of the comment period under paragraph (6). The Secretary must publish in the Federal Register an explanation of any substantive differences between the proposed and final rules. All final regulations must be consistent with the fishery management plan, with the national standards and other provisions of this Act, and with any other applicable law.

53, 104-297

(d) ESTABLISHMENT OF FEES.--

(1) The Secretary shall by regulation establish the level of any fees which are authorized to be charged pursuant to section 303(b)(1). The Secretary may enter into a cooperative agreement with the States concerned under which the States administer the permit system and the agreement may provide that all or part of the fees collected under the system shall accrue to the States. The level of fees charged under this subsection shall not exceed the administrative costs incurred in issuing the permits.

(2)(A) Notwithstanding paragraph (1), the Secretary is authorized and shall collect a fee to recover the actual costs directly related to the management and enforcement of any--

(i) individual fishing quota program; and

(ii) community development quota program that allocates a percentage of the total allowable catch of a fishery to such program.

(B) Such fee shall not exceed 3 percent of the ex-vessel value of fish harvested under any such program, and shall be collected at either the time of the landing, filing of a landing report, or sale of such fish during a fishing season or in the last quarter of the calendar year in which the fish is harvested.

(C) (i) Fees collected under this paragraph shall be in addition to any other fees charged under this Act and shall be deposited in the Limited Access System Administration Fund established under section 305(h)(5)(B), except that the portion of any such fees reserved under section 303(d)(4)(A) shall be deposited in the Treasury and available, subject to annual appropriations, to cover the costs of new direct loan obligations and new loan guarantee commitments as required by section 504(b)(1) of the Federal Credit Reform Act (2 U.S.C. 661c(b)(1)).

(ii) Upon application by a State, the Secretary shall transfer to such State up to 33 percent of any fee collected pursuant to subparagraph (A) under a community development quota program and deposited in the Limited Access System Administration Fund in order to reimburse such State for actual costs directly incurred in the management and enforcement of such program.

-297

(e) REBUILDING OVERFISHED FISHERIES.--

(1) The Secretary shall report annually to the Congress and the Councils on the status of fisheries within each Council's geographical area of authority and identify those fisheries that are overfished or are approaching a condition of being overfished. For those fisheries managed under a fishery management plan or international agreement, the status shall be determined using the criteria for overfishing specified in such plan or agreement. A fishery shall be classified as approaching a condition of being overfished if, based on trends in fishing effort, fishery resource size, and other appropriate factors, the Secretary estimates that the fishery will become overfished within two years.

(2) If the Secretary determines at any time that a fishery is overfished, the Secretary shall immediately notify the appropriate Council and request that action be taken to end overfishing in

the fishery and to implement conservation and management measures to rebuild affected stocks of fish. The Secretary shall publish each notice under this paragraph in the Federal Register.

(3) Within one year of an identification under paragraph (1) or notification under paragraphs (2) or (7), the appropriate Council (or the Secretary, for fisheries under section 302(a)(3)) shall prepare a fishery management plan, plan amendment, or proposed regulations for the fishery to which the identification or notice applies--

(A) to end overfishing in the fishery and to rebuild affected stocks of fish; or

(B) to prevent overfishing from occurring in the fishery whenever such fishery i identified as approaching an overfished condition.

(4) For a fishery that is overfished, any fishery management plan, amendment, or proposed regulations prepared pursuant to paragraph (3) or paragraph (5) for such fishery shall--

(A) specify a time period for ending overfishing and rebuilding the fishery that shall--

(i) be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock of fish within the marine ecosystem; and

(ii) not exceed 10 years, except in cases where the biology of the stock of fish, other environmental conditions, or management measures under an international agreement in which the United States participates dictate otherwise;

(B) allocate both overfishing restrictions and recovery benefits fairly and equitably among sectors of the fishery; and

(C) for fisheries managed under an international agreement, reflect traditional participation in the fishery, relative to other nations, by fishermen of the United States.

(5) If, within the one-year period beginning on the date of identification or notification that a fishery is overfished, the Council does not submit to the Secretary a fishery management plan, plan amendment, or proposed regulations required by paragraph (3)(A), the Secretary shall prepare a fishery management plan or plan amendment and any accompanying regulations to stop overfishing and rebuild affected stocks of fish within 9 months under subsection (c).

(6) During the development of a fishery management plan, a plan amendment, or proposed regulations required by this subsection, the Council may request the Secretary to implement interim measures to reduce overfishing under section 305(c) until such measures can be replaced by such plan, amendment, or regulations. Such measures, if otherwise in compliance with the provisions of this Act, may be implemented even though they are not sufficient by themselves to stop overfishing of a fishery.

(7) The Secretary shall review any fishery management plan, plan amendment, or regulations required by this subsection at routine intervals that may not exceed two years. If the Secretary finds as a result of the review that such plan, amendment, or regulations have not resulted in adequate progress toward ending overfishing and rebuilding affected fish stocks, the Secretary shall--

(A) in the case of a fishery to which section 302(a)(3) applies, immediately make revisions necessary to achieve adequate progress; or

(B) for all other fisheries, immediately notify the appropriate Council. Such notification shall recommend further conservation and management measures which the Council should consider under paragraph (3) to achieve adequate progress.

27, 104-297

(f) FISHERIES UNDER AUTHORITY OF MORE THAN ONE COUNCIL.--

(1) Except as provided in paragraph (3)[1], if any fishery extends beyond the geographical area of authority of any one Council, the Secretary may--

(A) designate which Council shall prepare the fishery management plan for such fishery and any amendment to such plan; or

(B) may require that the plan and amendment be prepared jointly by the Councils concerned.

No jointly prepared plan or amendment may be submitted to the Secretary unless it is approved by a majority of the voting members, present and voting, of each Council concerned.

(2) The Secretary shall establish the boundaries between the geographical areas of authority of adjacent Councils.

297

(g) ATLANTIC HIGHLY MIGRATORY SPECIES.--

(1) PREPARATION AND IMPLEMENTATION OF PLAN OR PLAN AMENDMENT.--The Secretary shall prepare a fishery management plan or plan amendment under subsection (c) with respect to any highly migratory species fishery to which section 302(a)(3) applies. In preparing and implementing any such plan or amendment, the Secretary shall--

(A) consult with and consider the comments and views of affected Councils, commissioners and advisory groups appointed under Acts implementing relevant international fishery agreements pertaining to highly migratory species, and the advisory panel established under section 302(g);

(B) establish an advisory panel under section 302(g) for each fishery management plan to be prepared under this paragraph;

(C) evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries and minimize, to the extent practicable, any disadvantage to United States fishermen in relation to foreign competitors;

(D) with respect to a highly migratory species for which the United States is authorized to harvest an allocation, quota, or at a fishing mortality level under a relevant international fishery agreement, provide fishing vessels of the United States with a reasonable opportunity to harvest such allocation, quota, or at such fishing mortality level;

(E) review, on a continuing basis (and promptly whenever a recommendation

---

Former paragraph (3) now appears at section 301(a)(3) and section 304(g).

pertaining to fishing for highly migratory species has been made under a relevant international fishery agreement), and revise as appropriate, the conservation and management measures included in the plan;

(F) diligently pursue, through international entities (such as the International Commission for the Conservation of Atlantic Tunas), comparable international fishery management measures with respect to fishing for highly migratory species; and

(G) ensure that conservation and management measures under this subsection--

(i) promote international conservation of the affected fishery;

(ii) take into consideration traditional fishing patterns of fishing vessels of the United States and the operating requirements of the fisheries;

(iii) are fair and equitable in allocating fishing privileges among United States fishermen and do not have economic allocation as the sole purpose; and

(iv) promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic highly migratory species.

(2) CERTAIN FISH EXCLUDED FROM "BYCATCH" DEFINITION.-- Notwithstanding section 3(2), fish harvested in a commercial fishery managed by the Secretary under this subsection or the Atlantic Tunas Convention Act of 1975 (16 U.S.C. 971d) that are no regulatory discards and that are tagged and released alive under a scientific tagging and release program established by the Secretary shall not be considered bycatch for purposes of this Act.

104-297

(h) REPEAL OR REVOCATION OF A FISHERY MANAGEMENT PLAN.--The Secretary may repeal or revoke a fishery management plan for a fishery under the authority of a Council only if the Council approves the repeal or revocation by a three-quarters majority of the voting members of the Council.

101-627, sec. 108(k), M-S Act § 304 note

Interim Management of Highly Migratory Species Fisheries.--Notwithstanding the amendments made by subsections (a) and (g) [of section 108 of Pub. L. 101-627], any fishery management plan or amendment which--

(1) addresses a highly migratory species fishery to which section 304(f)(3) of the Magnuson Fishery Conservation and Management Act (as amended by this Act [101-627]) applies,

(2) was prepared by one or more Regional Fishery Management Councils, and

(3) was in force and effect on January 1, 1990,

shall remain in force and effect until superseded by a fishery management plan prepared by the Secretary, and regulations implementing that plan.

104-297, sec. 109(d), M-S Act § 304 note

DELAY OF FEES.--Notwithstanding any other provision of law, the Secretary shall not begin the collection of fees under section 304(d)(2) of the Magnuson Fishery Conservation and Management Act, as amended by this Act [104-297], in the surf clam and ocean (including mahogany) quahog fishery or in the wreckfish fishery until after January 1, 2000.

104-297, sec. 109(h), M-S Act § 304 note

COMPREHENSIVE MANAGEMENT SYSTEM FOR ATLANTIC PELAGIC LONGLINE FISHERY.--(1) The Secretary of Commerce shall--

(A) establish an advisory panel under section 302(g)(4) of the Magnuson Fishery Conservation and Management

, as amended by this Act, for pelagic longline fishing vessels that participate in fisheries for Atlantic highly
ratory species;

conduct surveys and workshops with affected fishery participants to provide information and identify options
future management programs;

to the extent practicable and necessary for the evaluation of options for a comprehensive management system,
ver vessel production records; and

complete by January 1, 1998, a comprehensive study on the feasibility of implementing a comprehensive
agement system for pelagic longline fishing vessels that participate in fisheries for Atlantic highly migratory
ies, including, but not limited to, individual fishing quota programs and other limited access systems.

(2) Based on the study under paragraph (1)(D) and consistent with the requirements of the Magnuson
ery Conservation and Management Act (16 U.S.C. 1801 et seq.), in cooperation with affected participants in the
ery, the United States Commissioners on the International Commission for the Conservation of Atlantic Tunas,
the advisory panel established under paragraph (1)(A), the Secretary of Commerce may, after October 1, 1998,
lement a comprehensive management system pursuant to section 304 of such Act (16 U.S.C. 1854) for pelagic
line fishing vessels that participate in fisheries for Atlantic highly migratory species. Such a system may not
lement an individual fishing quota program until after October 1, 2000.

APPENDIX K

Additional Discussion of Federal Mandates Addressed in the Fishery Management Plans.

itional Discussion of Federal Mandates Addressed in FMPs

onal Environmental Policy Act (NEPA)

Act, signed into law in 1970 (42 U.S.C. 4321 et seq.), has two principal purposes. The first require federal agencies to evaluate, during the planning stages, impacts to the human ronment resulting from federal action. The intent of this requirement is to ensure that public als make well-informed decisions about the potential impacts of the actions they are idering. Second, NEPA promotes public awareness of potential impacts at the earliest ning stages of major federal actions. It includes mechanisms for public involvement in the ess in order to influence decision making on federal actions. In short, NEPA ensures that ronmental information is available to government officials and the public before decisions are e and before actions are taken.

ral fishery management actions subject to NEPA requirements include the approval of s and FMP implementing regulations. This requires preparation of either an environmental ct statement (EIS) or supplemental environmental impact statement (SEIS) for major fishery agement actions that significantly affect the quality of the human environment and ments that finding for public consideration and comment before a decision is made. If the n will not significantly affect the human environment, an environmental assessment (EA) be prepared. If an EA does not support a finding of no significant impact, then an EIS or must be prepared. In addition to NEPA implementing regulations (at 40 CFR 1500-1508), A compliance by fisheries management actions is guided by the National Oceanic and ospheric Administration's Administrative Order 216-6.

A and Magnuson-Stevens Act requirements for schedule, format, and public participation compatible and allow one document to fulfill both obligations. If an EIS or SEIS is prepared, ever, the notice of availability of a final EIS (or SEIS) must be published at least 30 days re a Secretarial decision is made concerning an FMP or FMP amendment approval.

angered Species Act (ESA)

ESA (16 U.S.C. 1531 et seq.) provides for the protection and conservation of endangered threatened species of fish, wildlife and plants. Section 7(a)(1) of the ESA requires federal cies to "conserve" endangered and threatened species, however, "conservation" is broadly ed. Section 7(a)(2) of the ESA requires federal agencies to insure that any action authorized, ed, or carried out by such agencies is not likely to jeopardize or result in the destruction or rse modification of the critical habitat of endangered or threatened species.

shing activities under an FMP must be considered; not just the specific management action r consideration. The NMFS must conduct a formal Section 7 consultation that results in a gical opinion (BO) if a proposed action "may effect" or "is likely to adversely affect" ngered or threatened species or their critical habitat. If the BO concludes that the proposed action "is likely to jeopardize the continued existence of" threatened or endangered species, then reasonable and prudent alternatives are developed to minimize or mitigate the effect of th action. Once determined, the reasonable and prudent alternatives may require implementation of federal regulations.

Marine Mammal Protection Act (MMPA)

The MMPA (16 U.S.C. 1361 et seq.) establishes a moratorium on the "taking" and importing of marine mammals and marine mammal products, with certain exceptions. Responsibility to authorize takings under limited circumstances, including those related to commercial fishing operations, is divided between the NMFS (for whales, porpoises, seals, and sea lions) and the Department of Interior (for other marine mammals, e.g. walrus, otters). If a fishery affects a marine mammal population, then the potential impacts of the fishery must be analyzed in the appropriate EA or EIS, and the Council or the NMFS may be requested to consider regulations to mitigate adverse impacts. Fisheries may fall in one of three categories based on the level of interaction between fishing vessels and marine mammals. Fisheries under the Council's Pelagic FMP fall in Category III, fisheries with the lowest level of impacts.

The Fish and Wildlife Coordination Act (FWCA)

The FWCA authorizes collection of fisheries data and coordination with other agencies for environmental decisions affecting living marine resources. Both formal and informal consultations, cooperative research, and data gathering programs are routinely pursued.

Coastal Zone Management Act (CZMA)

The CZMA (16 U.S.C. 1451 et seq.) is designed to encourage and assist states in developing coastal management programs, to coordinate state activities, and to safeguard regional and national interests in the coastal zone. Section 307(c) of the CZMA requires that any federal activity affecting the land or water uses or natural resources of a state's coastal zone be consistent with the state's approved coastal management program, to the maximum extent practicable.

A proposed fishery management action that requires an FMP amendment or implementing regulations must be assessed to determine whether it directly affects the coastal zone of a state with an approved coastal zone management program. If so, the NMFS must provide the state agency having CZM responsibility with a consistency determination for review at least 90 days before final action of the NMFS.

Administrative Procedure Act (APA)

The APA (5 U.S.C. 553) requires federal agencies to give the public prior notice of rule making and an opportunity to comment on proposed rules. General notice of proposed rulemaking t be published in the Federal Register, unless persons subject to the rule have actual notice ne rule. Proposed rules published in the Federal Register must include reference to the legal ority under which the rule is proposed and explain the nature of the proposal including what on is proposed, why, what is its intended effect, and any relevant regulatory history that vides the public with a well-informed basis for understanding and commenting on the posal. The APA does not specify how much time the public must be given for prior notice opportunity to comment; however, NOAA subscribes to 30 days as a reasonable period for public to be informed and submit comments on proposed fishery management regulations. eptions to 30-day prior notice protocol include (a) proposed rules that would implement amendments, in which case the Magnuson-Stevens Act indicates a 45-day period, and (b) rgency regulations that often require immediate implementation.

e regulations (e.g., emergency or interim) may be implemented immediately under the APA n the agency, for good cause, finds that prior notice and opportunity for public comment is actical, unnecessary, or contrary to the public interest. The “good cause” reason for waiving nal public procedure must be fully explained in the Federal Register notice which publishes inal rule. The Magnuson-Stevens Act (at section 305(c)) places further conditions and rictions on the use of emergency or interim fishery regulations. For example, an emergency iterim fishery management measure may remain in effect for not more than 180 days and be extended, by notice in the Federal Register, only once for an additional 180-day period.

August 21, 1997 (62 FR 44421), NOAA published further policy guidelines in the form of ria and justification standards for using emergency rule authority to address marine fishery agement issues.

ulatory Flexibility Act (RFA).

RFA (5 U.S.C. 601 et seq.) requires federal agencies to assess the impacts of their proposed lations on small entities and to seek ways to minimize economic effects on small entities that ld be disproportionately or unnecessarily adversely affected. The most recent amendments ne RFA were enacted on March 29, 1996, with the Contract with America Advancement Act 996 (Public Law 104-121). Title II of that law, the Small Business Regulatory Enforcement ness Act (SBREFA), amended the RFA to require federal agencies to determine whether a posed regulatory action would have a significant economic impact on a substantial number of l entities. For a federal agency, the most significant effect of SBREFA is that it made pliance with the RFA judicially reviewable.

assessment requirement of the RFA is satisfied by a regulatory flexibility analysis, which ies to regulatory actions for which prior notice and comment is required under the APA. rgency or interim rules that waive notice and comment are not required to have regulatory bility analyses. Further, regulatory flexibility analyses are required only when an action is ected to have a “significant economic impact” on a “substantial number of small entities”.

Paperwork Reduction Act of 1995 (PRA)

The PRA (44 U.S.C. 3501 et seq., and 5 CFR part 1320) is designed "to minimize the paperwork burden for individuals, small businesses, educational and nonprofit institutions, federal contractors, state, local and tribal governments, and other persons resulting from the collection of information by or for the Federal Government." In brief, this law is intended to ensure that the government is not overly burdening the public with requests for information. This is accomplished through an information collection budget (ICB). The ICB for each agency is in terms of the total estimated time burden of responding to official inquiries. The President's Office of Management and Budget (OMB) oversees the ICB of each agency. Agencies must annually identify and obtain clearance from OMB for new or significant revisions to reporting and record keeping requirements.

Procedurally, the PRA requirements constrain what, how, and how frequently information will be collected from the public affected by a rule that requires reporting (e.g., harvested fish). New collections of information must be submitted to OMB for clearance before a final rule may take effect. For each rule that requires a collection of information, the agency must describe in detail what data will be collected, how it will be collected and how often, from whom it will be collected, how much time will be spent by each affected person in complying with the information requirements, why the information is necessary and how it will be used. OMB can take 60 days to review and clear proposed information collection; hence, to avoid a PRA delay of a rule, the NMFS tries to start the PRA review and clearance process at least 30 days before submission of a proposed rule for review in the NMFS' central office. Information collections approved by OMB have a maximum effectiveness of three years. To be extended beyond that time requires another submission for OMB clearance. Required collections of information from the public cannot be enforced without being included in an approved ICB.

Freedom of Information Act (FOIA)

The original FOIA (5 U.S.C. 552) allowed the public to obtain government information, provided the information is not protected by one of the nine specific FOIA exemptions, and requires that an agency respond to a FOIA request within specified time limits. Exempted information includes: classified secret matter of national defense or foreign policy, internal personnel rules and practices, information specifically exempted by other statutes, trade secrets and commercial and financial information, privileged interagency or intra-agency memoranda or letters, personal information affecting an individual's privacy, and investigatory records for law enforcement purposes.

In 1996, the Electronic FOIA (E-FOIA) amendments (Public Law 104-231) changed FOIA by (among other things) extending the time limit agencies had to respond to FOIA requests and requiring agencies to make reports available to the public by computer telecommunications or other electronic means, including listing their major information systems and a guide for obtaining information, and establishing an electronic reading room that includes agency policies, manuals, and an index of records released under FOIA requests.

shery management actions are subject to FOIA requests except for the exempted mation detailed above. The NMFS compliance with FOIA is guided by NOAA inistrative Order 205-14.

cutive Order 12866: Regulatory Planning and Review

utive Order (EO) 12866 was signed by the President on September 30, 1993, published ber 4, 1993 (58 FR 51735), and replaced EO 12291 and EO 12498. Its purpose, among r things, is to enhance planning and coordination with respect to new and existing ations, and to make the regulatory process more accessible and open to the public. In ion, EO 12866 requires agencies to take a deliberative, analytical approach to rule making, ding assessment of costs and benefits of the intended regulations. For fisheries management oses, it requires the NMFS to prepare (a) a regulatory impact review (RIR) for all regulatory ns, and (b) a unified regulatory agenda twice a year that informs the public of the agency's cted regulatory actions.

purpose of an RIR is to assess the potential economic impacts of a proposed regulatory n. As such, it can be used to satisfy NEPA requirements and as a basis for determining her a proposed rule will have a significant impact on a substantial number of small entities h would trigger the completion of an IRFA under the RFA. For this reason, the RIR is iently combined with an EA and an IRFA in a single EA/RIR/IRFA document that satisfies the tical requirements of NEPA, RFA and EO 12866 for any proposed rule. Criteria for rmining "significance" for EO 12866 purposes, however, are different than those for rmining "significance" for RFA purposes.

makes the ultimate determination of significance under this EO based, in large measure, in nalysis in the RIR. An action determined to be significant is subject to OMB review and ance before its publication and implementation.

itial determination of significance, frequently without benefit of an RIR, is made for each osed regulatory action by the NMFS through a "listing document." The listing document is ef description of a proposed regulatory action, including a regulatory identifier number), and the expected schedule for rule making. Listing documents are prepared by the NMFS ubmitted through NOAA General Counsel and Department of Commerce Office of eral Counsel to OMB. If OMB concurs in a determination of "not significant" under EO 6, then OMB will not need to review the rule. In practice, the NMFS attempts to submit a document at least three months before submission of the proposed rule.

regulatory planning function of EO 12866 is served by the unified regulatory agenda which is ared twice a year to inform the public of the agency's expected regulatory actions and ide brief descriptions and timelines. In addition, a regulatory plan is prepared annually to report on the most significant regulatory actions that the agency reasonably expects to issue in proposed or final form in that fiscal year or later.

Executive Order 12630: Takings

This EO on Government Actions and Interference with Constitutionally Protected Property Rights came into effect on March 18, 1988. This EO requires that each federal agency prepare a "takings implications assessment" for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Fishery management measures that limit fishing seasons, areas, catch quotas, the size of harvested fish, and bag limits do not appear to have any takings implications, and thus, no takings implications assessment is required. However, if a fishing gear type is prohibited, for example, in such a way that a fisherman leaving the fishery would be unable to sell his investment in the gear, or if a fisherman is prohibited by federal action from exercising property rights granted by a state, then a takings implication assessment may need to be prepared.

"Takings" issues are raised frequently in the context of limited access systems that confer a harvesting privilege on a fisherman in the form of a permit to catch a specific amount of fish or a license to enter and participate in a fishery. Although such permits and licenses may be transferrable and therefore increase (or decrease) in market value, they themselves do not convey any property rights in the fishery resource (i.e., the fish). If, however, the federal government were to drastically reduce the amount of fish that may be harvested from a fishery for which a fisherman had a limited license or permit, and thereby reduce the transfer value of that license or permit, "takings implications" may exist.

Executive Order 12898: Environmental Justice

Executive Order 12898, issued in 1994, requires that federal agencies incorporate Environmental Justice into their mission by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low income populations in the U.S.

Executive Order 13132: Federalism

The "Federalism" EO was signed by the President on August 4, 1999, and published August 10, 1999 (64 FR 43255). This EO superceded the previous "Federalism" EOs (12612 and 13083) but supplements EOs 12372, 12866, and 12988. This EO is intended to guide federal agencies in the formulation and implementation of "policies that have federalism implications." Such policies include regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.

e EO establishes fundamental federalism principles based on the U.S. Constitution, specifies eralism policy making criteria and special requirements for preemption of state law. For mple, a federal action that limits the policy making discretion of a state is to be taken only ere there is constitutional and statutory authority for the action and it is appropriate in light of presence of a problem of national significance. Also, where a federal statute does not have ressed provisions for preemption of state law, such a preemption by federal rule making may done only when the exercise of state authority directly conflicts with the exercise of federal hority. Conflict between state and federal law is possible on fishery management issues, vever, the Magnuson-Stevens Act (at sec. 306) explicitly establishes conditions for federal emption of state regulations (and extension of state fishery management authority into the Z). This EO also requires consultation between federal and state officials, and requires a eralism impact statement for rules that have federalism implications.

ecutive Order 12114: Environmental Effects Abroad

s EO, issued in 1979, directs agencies to consider the effects of major federal actions upon environment of foreign nations of the “global commons”. These actions include those major eral actions that result in significant environmental effects that extend outside of the graphic borders of the U.S. In some cases, an EIS may be required. The EO encourages ernational agreements and an exchange of information between the affected nations and the ited States.

ecutive Order 13158: Marine Protected Areas

s new EO, signed by the President on May 26, 2000 and published on May 31, 2000 (65 FR 09), directs the Department of Commerce and the Department of the Interior to jointly velop a national system of marine protected areas (MPAs). The purpose of the system is to engthen the management, protection, and conservation of existing protected areas and ablish new or expanded MPAs. The MPA system is to be scientifically based, representing erse U.S. marine ecosystems, and the nation’s natural and cultural resources. Establishing h a system is intended to reduce the possibility that MPAs are harmed by federally approved funded activities.

ecutive Order 12962: Recreational Fisheries

June 7, 1995, the President signed E.O. 12962 to improve the quality, function, sustainable ductivity, and distribution of U.S. aquatic resources for increased recreational fishing ortunities nationwide.

APPENDIX L

mary of the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region and Amendments.

mmary of Pelagic FMP and Amendments

is material is reproduced from "Preparation of Fishery Management Plans and Plan endments: Compliance With the National Environmental Policy Act" produced by the stern Pacific Regional Fishery Management Council.

Pelagic Fisheries

Chronology of implemented management actions and related NEPA documentation

.1 FMP, EA

le: Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region

.1.1 Relevant dates

Document date: July, 1986

Final rule effective date: March 23, 1987 (52 FR 5987)

.1.2 Major regulatory provisions

Permits: foreign longliners require permit; experimental fishing permit for domestic ift-gillnet fishing.

Monitoring:

- Foreign longliners: file effort plans two months prior to EEZ entry; carry observers as directed by RD; maintain fishing logbooks.
- Domestic drift-gillnetters (under experimental fishing permit): collect catch-effort data and protected species interactions.
- Foreign pole-and-line vessels: voluntary submission of incidental catch data (mandatory reporting to be considered if voluntary effort fails).
- (Domestic fisheries: state/territorial monitoring programs continue).

Closed areas: various sizes designated around island areas for foreign longliners.

Gear restrictions: no foreign drift-gillnets, domestic with experimental fishing permit ly.

Procedural matters: annual reports to be prepared; five-year review of FMP.

1.1.1.3 Discussion

Management of pelagic fisheries was complicated at the time of FMP preparation becau of the United States' controversial policy towards highly migratory species which did not recognize coastal states' jurisdiction (and was subsequently changed in 1990 as part of re-authorization of the Magnuson Act). Management authority extended only to incidentally caug non-tuna species which were construed to be non-migratory although stock ranges of many of these species were as broad as the excluded tunas. Thus the FMUS are in fact by-catch in most of the foreign and some of the domestic fisheries. Measures could be imposed as long as they gave foreign vessels a "reasonable opportunity" to fish within the EEZ and impose the least burden to achieve effective management of incidentally caught fish. Since 1980 non-tuna pelagic species in the Western Pacific EEZ's had been managed under a Preliminary Management Plan (PMP) promulgated by NOAA through the Secretary of Commerce. The PM applied only to foreign fishing, thus legally (if not practically) allowing such a fishery in the interim before an FMP (which would also apply to domestic fisheries) was implemented. It set quota (or TALFF and reserve) for managed species. The quota and ancillary poundage fees levied on actual catches were a sufficient deterrent so that no foreign fishing actually occurred i the EEZ's after promulgation of the PMP.

A further complication is the wide variety of gear types used and fishing styles practiced by foreign and especially domestic fishers. Each of these has a somewhat different 'by-catch' fo FMU species. In addition, (as in the bottomfish fishery) the recreational-subsistence-quasi-commercial component of the domestic catch is significant. Accurate data is generally not available from these sectors.

The goals of the plan are generally to enhance domestic fishing for FMU species while providing foreign vessels targeting on tuna a reasonable to fish in the EEZ's. The main provisio in the FMP is the area closures for foreign vessels; complete closure of the Hawaiian and Guam EEZ's were initially proposed but this was judged to violate the "reasonable opportunity" test required under U.S. tuna policy. Although many billfish apparently migrate in to coastal waters from a common central Pacific stock, it was felt that area closures would at least eliminate localized competition for billfish (but not necessarily pan-stock interactions). At the time of FMP preparation available data from both foreign fishers (because FMUS are not target species) and domestic (because of the large non-commercial and non-reported component) were somewhat limited. Monitoring actions seek to increase reporting from foreign vessels. State programs for monitoring commercial fisheries continue to be the main data source in these fisheries. Since the Hawaii recreational troll fishery is a major harvester of FMUS, joint monitoring efforts with Hawaii DAR are described.

The Plan proposes a variety of alternative measures. The no action alternative would be to leave the PMP in place. Amending the PMP represents another broad action that was rejected A number of alternative management strategies are then presented:

1. Foreign longline fisheries:
    - monitoring only
    - control fishing effort
    - control fishing effort on a seasonal basis
    - control catch
    - placement of observers on a voluntary basis

2. Foreign pole-and-line fisheries:
    - monitoring only
    - control fishing effort

3. Foreign purse seine fisheries:
    - monitoring only

4. Foreign drift-gill-netters:
    - control fishing effort

These strategies are somewhat confusing as they are directed towards particular fisheries; ılike the preferred alternative (proposed actions) they do not contain measures across fisheries. ius it is difficult to determine if these are in fact strategies (a compendium of measures mprising an integrated plan) or simply discrete measures. As a result they don't come across genuine alternatives. These strategies are rated against the FMP's goals, presented in tabular rmat (Table 7.10). The accompanying text then discounts the results because assignment of lues *vis a vis* goal attainment is "highly subjective". In addition, the preferred alternative is not cluded in the table for comparison. The impression given (fostered by confusingly presented d incomplete information) is that one or more of the rejected alternatives may have been eferable in terms of attainment of Plan goals and this fact was 'covered up.'

NEPA information is provided in Section 9.7. The actions are evaluated against the five iteria outlined in NOAA Directive Manual 02-10 (similar to NAO 216-6 Section 6.02) to etermine whether an EIS is necessary. (It should be noted that NAO 216-6 (6.01.b.1) states that EIS may be required if impacts are beneficial or adverse; it is not clear whether the actions are sessed for positive as well as negative impacts.) Additional broad criteria to assess gnificance are also considered: socio-economic impacts, controversy, uncertainty and impact cultural and historic resources. A FONSI determination is made and so stated at the end of is section.

1.2 Regulatory Amendment (55 FR 42967), CE

ederal Register date: October 25, 1990

nal rule effective date: November 26, 1990

SUMMARY: NOAA issues this final rule as an addition to the regulations implementing the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region (FMP). The rule makes it a Federal requirement that catch and effort data for pelagic management unit species (PMUS) be reported to the State of Hawaii, the Territory of American Samoa, and the Territory of Guam, and Hawaii to monitor catch and effort of the PMUS. This rule will foster coopertive enforcement efforts between NMFS, the U.S. Coast Guard, and the state/territorial enforcement agents to ensure compliance with catch reporting requirements without imposing any additional Federal data collection rules.

1.1.2.1 Major regulatory provisions

Monitoring: Requires catch and effort data be reported to state agencies.

1.1.3 Amendment 1, EA

Title: Amendment 1 and Environmental Assessment, Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Ocean

1.1.3.1 Relevant dates

Document date: November, 1990

Implemented: March 1, 1991 (56 FR 9686)

1.1.3.2 Major regulatory provisions

Procedural matters: adopt mandated definition of overfishing; billfishes, mahimahi and wahoo SPR of 0.20, oceanic sharks SPR of 0.35; revise FMP objectives.

1.1.3.3 Discussion

The overfishing definition was mandated by the DOC Secretary's revised guidelines which specify "an objective and measurable definition of overfishing for each stock or stock complex." Five estimation procedures are outlined but it is noted that "SPR cannot be estimated reliability with any of the above estimators using statistics from the U.S. EEZ alone" (p. 13). The amendment discusses revision of the optimum yield (OY) definition in the FMP but notes that this cannot be done until greater knowledge of these Pacific-wide stocks is acquired. FMP objectives are revised to more explicitly address the need to achieve OY. Two alternatives (aside from no action) are proposed: using an SPR other than 0.20 for billfishes, mahimahi and wahoo, and using an MSY-based definition of overfishing for oceanic sharks. The NEPA section addresses the set of criteria used in the FMP (and found in NAO 216-6 and elsewhere) followed by the FONSI statement.

.4 Amendment 2, EA

le: Amendment 2 and Environmental Assessment, Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region

.4.1 Relevant dates

Document date: February, 1991

Final rule effective date: May 26, 1991 (56 FR 24731)

.4.2 Major regulatory provisions

Permits: require a federal permit for U.S. longline and transshipment vessels (whether or t fishing in EEZ).

Monitoring: logbooks required for U.S. longliners; vessel and gear identification.

Protected species: notification by longliners if intending to fish within 50 miles of ected NWHI for possible observer coverage; required orientation meeting about protected ecies for vessel operators fishing in NWHI.

Procedural matters: redefine the management unit to consist of the species management its across their range and longline and support vessels operating both inside and outside the Z but having impacts on fish and fishing within EEZ.

.4.3 Discussion

This amendment makes permanent an emergency elements of an interim rule that became fective on November 27, 1990 (55 FR 42985) with some adjustments. The most significant is e redefinition of the FMU. The Hawaii-based longline fleet expanded rapidly during this riod and targeted FMUS (especially swordfish and marlin) in addition to tunas. In targeting ordfish longliners in the NWHI were fishing close in shore and their was evidence of protected ecies interactions: monk seals with hooks in or non-natural injuries to their bodies for example. e main purpose of the amendment is to increase the quality and quantity of data on the mestic longline fishery. During this period the Council had also requested the Secretary, DOC ablish an entry moratorium for the longline fishery based on a control date of June 21, 1990 e Amendment 4). Rejected alternatives (aside from no action) include:

1. permits and logbooks only;
2. same as preferred alternative except that observer requirement applies to vessels fishing within 12 miles (instead of 50 miles) from selected NWHI.

The NEPA section contains a short summary of the document. The EA is evaluated in terms of the criteria used in other Pelagic FMU documents for a FONSI.

1.1.5 Amendment 3, CE

Title: Amendment 3, Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region (includes Regulatory Impact Review and Proposed Regulations

1.1.5.1 Relevant dates

Document date: June, 1991

Final rule effective date: October 14, 1991 (56 FR 52214)

1.1.5.2 Major regulatory provisions

Closed areas: extends closure of PSZ to longline fishery established in emergency interim rule (56 FR 15842).

Protected species: designates a protected species zone (PSZ) for waters within 50 nm of NWHI and corridors between islands more than 100 nm apart; establishes a process for the RD to designate additional conservation measures applicable within the PSZ.

1.1.5.3 Discussion

Mounting evidence suggested that there were interactions between longline gear and monk seals. Although there was no direct documentation of resultant mortality, circumstantial evidence suggested that this was so. This makes permanent elements of the interim rule implemented on April 18, 1991 (56 FR 15842). Rejected alternatives (aside from no action) would create a PSZ based on a definition different from 50 nm. The NEPA section states that a EA was prepared for the emergency interim rule and thus "this action is categorically excluded from the requirement to prepare an environmental assessment by NOAA Directive 02-10" (p. 10).

1.1.6 Amendment 4, CE

Title: Amendment 4 to the Fishery Management Plan for the Pelagics of the Western Pacific Region, Extend the Hawaii Longliner Moratorium for a total of 3 Years, Includes Environmental Assessment and Regulatory Impact Review

1.1.6.1 Relevant dates

Document date: June, 1991

Final rule effective dates: October 16, 1991-April 22, 1994(56 FR 14866)

1.6.2 Major regulatory provisions

Monitoring: test vessel monitoring systems (VMS) to track location; establish process r requiring use by vessels.

Procedural matters: extend entry moratorium to longline fishery established by nergency interim rules (56 FR 14866, 4/12/91 and 56 FR 28116, 6/19/91) for three additional ears.

1.6.3 Discussion

The main interim rule (effective date, April 23, 1991) established a three-year oratorium on new entry into the longline fishery based on a control date of June 21, 1990. The roposed amendment changes the control date (which establishes eligibility based on articipation in the fishery prior to that date) at December 5, 1990. It also admitted five vessels om the NWHI lobster fishery due to hardship conditions in that fishery. This amendment is in esponse to the doubling of Hawaii-based longline vessels between 1989 and the amendment ate. Most of the new entrants had moved from home ports in the Gulf of Mexico. These vessels e larger, range further and have greater fishing power than older Hawaii-based 'sampan-style' ongliners. The longline fleet very rapidly became the largest component of Hawaii commercial sheries.

The amendment also discusses testing of remote vessel tracking systems in the context of etermining whether U.S. longline vessels fishing exclusively outside the EEZ should be xempted from the moratorium (which applies to landing fish in Hawaii).

Rejected alternatives (aside from no action) are:

1. "Only" implement area closures around MHI. This alternative is somewhat confusing as it refers to another emergency interim rule not yet implemented at the time of this amendment.
2. A shorter or longer moratorium period.
3. Moratorium applied only to vessels fishing in EEZ (contrasted to preferred alternative of application to entire species range).
4. Make permits transferable or implement ITQs.
5. Exempt species not significant in coastal small-boat fisheries (e.g., swordfish).
6. Limit berthing spaces in Honolulu Harbor.

The list of alternatives is slightly confusing because of the inclusion of an alternative that oes not seem to bear directly on the preferred alternative (closed areas) and listing of a preferred lternative (application of moratorium to vessels fishing in full species range) in this list to ontrast it with the rejected alternative. The NEPA section notes that the NMFS prepared an EA for the interim regulations establishing the emergency closure. Although there is no specific mention that this action categorically excluded, it contains a FONSI statement based on criteria similar to those in other Pelagic FMU documents.

1.1.7 Amendment 5, SEA

Title: Amendment 5, Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region

1.1.7.1 Relevant dates

Document date: October, 1991

Final rule effective date: March 2, 1992 (57 FR 7661)

1.1.7.2 Major regulatory provisions

Closed areas: prohibit longline fishing within 75 or 50 nm of designated MHI and withi 50 nm of the 100 fathom isobath around Guam and its offshore banks and FADs.

Procedural matters: establish framework process to adjust area closures annually and/o in-season; establish framework process for exempting individual vessel owners from area closures.

1.1.7.3 Discussion

The amendment makes the MHI area closure established by interim rules (56 FR 28116, June,19, 1991; corrected at 56 FR 31689 on July 11, 1991 and extended at 56 FR 47701 on September 20, 1991) permanent and extends it to Guam. Framework procedures are outlined in order to review and adjust area closures by annual review or immediately (in-season) if warranted, and to exempt fishermen on a case-by-case basis if historic dependence and economic hardship can be demonstrated. Whether or how NEPA requirements would be addressed in framework procedures is not discussed. Rejected alternatives (aside from no action) are:

1. smaller closed areas (Guam and Hawaii);
2. exemption of small vessels (e.g. less than 50 ft.) from area closures (Hawaii only).

The NEPA section notes that an EA was prepared for the emergency interim rule. This amendment is intended to supplement that EA because of the additional framework provisions not included in the interim rule and the inclusion of Guam provisions. It states that a "supplemental EA discussing Guam is attached" (p. 40). This is not the case (e.g., there is no appendix with a separate supplemental EA discussing the Guam provisions exclusively) but the amendment--which incorporates a full discussion of the Guam provisions--conforms to a ndard amendment format that satisfies NEPA requirements. The FONSI is based on review of teria similar to those used in other Pelagic FMU documents.

.8 Amendment 6, EA

le: Amendment 6, Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region. Proposed Actions: 1) include tunas and related species in the FMP; 2) establish consistent regulations for foreign and domestic longline vessels; 3) establish general regulations for other foreign vessels fishing for pelagic species.

.8.1 Relevant dates

Document date: April, 1992

Final rule effective date: November 27, 1992 (57 FR 48564)

.8.2 Major regulatory provisions

Other: Include tunas (species previously excluded from management jurisdiction) in IU; develop mandated overfishing definition for these species; develop regulatory framework allow foreign fishing for these species.

.8.3 Discussion

The 1990 amendments to the Magnuson Act recognized coastal state jurisdiction over ighly migratory species" (defined as tuna and related species). This meant that these species n now be regulated under the Pelagic FMP which had previously been focused on the 'by-ch' in these fisheries (although the expanded Hawaii-based longline fleet targets on some non-a pelagics). Rejected alternatives (aside from the no action alternative) are:

1. develop a new FMP for tunas only;
2. define overfishing for tunas as an SPR other than 0.2;
3. establish additional management measures for domestic tuna vessels (rejected because a separate amendment is to be prepared to establish a limited entry program to replace the moratorium).

The NEPA section contains a FONSI statement without discussion of criteria as in other endments.

.9 Regulatory Amendment (58 FR 14170), CE

deral Register date: March 16, 1993

Final rule effective date: April 15, 1993

SUMMARY: NMFS issues this final rule recommended by the Western Pacific Fishery Management Council (Council) to revise requirements for making and identification of gear used by operators of domestic and foreign longline fishing vessels operating under the Fishery Management plan for the Pelagic Fisheries of the Western Pacific Region (FMP). The change requires operators of permitted longline vessels to mark all their longline floats and buoys, whether deployed in the exclusive economic zone (EEZ) or possessed on board the vessel. The regulations previously required operators of permitted longline fishing vessels to mark floats and buoys only when attached to deployed longline gear; this limited the effectiveness of the regulations. The final rule also allows for the confiscation of unmarked longline gear that is found deployed in the EEZ. This will reduce the likelihood of abandoned gear impacting other fisheries or protected species.

1.1.9.1 Major regulatory provisions

Monitoring: Revises gear identification requirements.

1.1.10 Regulatory Amendment (58 FR 49438), CE

Federal Register date: September 23, 1993

Final rule effective date: October 25, 1993

SUMMARY: NMFS removes Federal regulations governing foreign longline fishing for pelagic species, other than tuna, in the exclusive economic zone (EEZ) off the Commonwealth of the Northern Mariana Islands (CNMI) and the west coast of the U.S. mainland. Foreign fishing in these areas is governed by the Preliminary Fishery Management plan for Pacific Billfish, Oceanic Sharks, Wahoo, and Mahimahi (PMP). The Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region (FMP), which manages all domestic and most foreign fishing for pelagic species off the coasts of Hawaii and U.S. territories of the western Pacific, has largely replaced the PMP. Withdrawing the PMP and its implementing rules will reduce the complexity caused by having two separate management approaches for foreign fishing.

1.1.10.1 Major regulatory provisions

Procedural: Withdraws rules on fishing for non-tuna species in CNMI waters implemented under PMP.

1.1.11 Regulatory Amendment (59 FR 18499), EA

Federal Register date: April 19, 1994

erim final rule effective date: April 23, 1994

MMARY: NMFS adopts as final, with one change, the interim final rule authorizing the uthwest Regional Director (RD), NMFS, to require the owner or agent of a vessel with a mit for the longline fishery to make accommodations for a NMFS observer. This final rule uires permit holders or their designated agents (which may include the vessel operator) to vide NMFS with at least 72 hours notice (not including weekends and Federal holidays) prior each departure from port so the RD can determine if an observer placement will be made. This ion is necessary to ensure adequate collection-of-data on the frequency and nature of eractions between longline fishing gear and sea turtles around Hawaii to ensure the fishery erates in compliance with the Endangered Species Act (ESA).

.11.1 Major regulatory provisions

Monitoring: Requires vessel owner/operator to notify NMFS prior to departure in order decide if an observe is required on the trip.

.12 Amendment 7, EIS

le: Amendment 7 to the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region, Proposed Limited Entry Program for the Hawaii Longline Fishery (measures to replace the 1991-94 moratorium on new entrants to the fishery), Includes Final Environmental Impact Statement and Regulatory Flexibility Analysis.

.12.1 Relevant dates

Document date: January, 1994

Final rule effective date: June 24, 1994 (59 FR 26979)

.12.2 Major regulatory provisions

Permits: establish limited entry program with single permit and including fees to cover ninistrative costs.

Procedural matters: establish framework procedure to modify limited entry program luding established and new measures.

Other: allow transiting longliners entry to Hawaii ports and EEZ; add additional species MU; modify OY definition.

.12.3 Discussion

This amendment transforms the three year entry moratorium established in Amendment 4 into a limited entry permit program. Specific qualification criteria are described. Vessels can only upgraded to the size of the largest longline vessel fishing under the moratorium. Permits ar transferable subject to vessel size limits.

Separate framework procedures for modifying established measures (i.e., by this and other amendments) and new measures(i.e., not used before or not applied to the fishery in question). Established measures are listed. Description of the framework processes does not explicitly address NEPA requirements although in both cases a proposal document must be prepared for submission to RD and this might be the entry point for environmental assessment. Minor provisions simply permits by only requiring a single permit for limited entry qualifiers (versus both a general commercial permit and a longline permit), adds three species groups to the FMU and allows non-permitted longliners to transit the Hawaii EEZ and enter its ports as long as no pelagic species are off-loaded.

Rejected alternatives are organized in sections describing each preferred alternative. No action alternatives are listed by section with reference to preferred alternative. Rejected alternatives (aside from no action) are:

1. Limited Entry Program:
    - limit entry so that fleet-wide harvesting capacity does not exceed maximum capacity during moratorium;
    - limited entry permits transferrable, no harvest capacity limits;
    - extend current moratorium regulations;
    - dual permit system with second unrestricted permit for vessels only fishing outside the EEZ;
    - open access.

2. Framework procedures:
    - framework limited entry procedures only;
    - no new framework procedures.

3. Permit fees
    - no permit fees.

A variety of regulatory measures that were not evaluated are briefly described. Because the amendment is an FEIS it includes comments on the DEIS and responses to those comments.

1.1.13 Regulatory Amendment (59 FR 58789), CE

Federal Register date: November 15, 1994

Final rule effective date: December 15, 1994

JMMARY: NMFS issues a final rule implementing an experimental vessel monitoring ogram in the pelagic longline fishery around Hawaii using an electronic vessel monitoring stem (VMS). Under this program, vessels operating in this fishery, upon notification by MFS, are required to carry vessel monitoring equipment owned and installed by NMFS. Such uipment allows a vessel to be identified and its location monitored by satellite. Such formation will be used by NMFS and the U.S. Coast Guard (USCG) in the enforcement of gulations that prohibit fishing in closed areas. This experimental program, which is to run for 3 ars or less, is needed so that the Western Pacific Fishery Management Council (Council) and MFS can evaluate the performance and cost-effectiveness of VMSs and make commendations regarding the future use of VMSs in this and other fisheries.

1.13.1 Major regulatory provisions

Monitoring: Hawaii longline permit holders required to use VMS.

1.14 Amendment 8, EA (SFA)

itle: Magnuson-Stevens Act Definitions and Required Provisions... Amendment 8 to the Pelagic Fisheries Management Plan

1.14.1 Relevant dates

Document date: September 1998
Final rule effective date: April 19, 1999 (64 FR 19067)- partial approval

1.14.2 Major regulatory provisions

Procedural matters: New definitions and fishery plan provisions. (See Table 3.1 for tails).

1.14.3 Discussion

See section 3.1.5.3 for a description of the comprehensive amendment.

2 Management Actions in Preparation

2.1 Regulatory Amendment (PRIA permits)

tle: Regulatory Amendment Establishing Permit and Reporting Requirements for the Pelagic Troll and Handline Fishery in the Remote Island Areas of the Western Pacific Region

1.2.1.1 Relevant dates

Document date: September 22, 1999

Under NMFS review

1.2.1.2 Major regulatory provisions

Permits: Required to harvest pelagic MUS around Howland, Baker, Jarvis, and Wake Islands; Johnston, Midway, and Palmyra Atolls; and Kingman Reef (Pacific remote island areas-PRIAs).

Monitoring: Logbooks are required for vessels operating under the proposed permit. The current logbook required by the US Fish and Wildlife Service for charter vessels operating at Midway Atoll meets this requirement.

1.2.1.3 Discussion

This management initiative is prompted by an increase in commercial fisheries around the PRIAs since 1998. Vessels from the Hawaiian longline fleet and two Hawaii-based troll/handline vessels are operating at Palmyra Island and Kingman Reef. With the introduction of tourism to Midway, charter boats now operate there. Thus there is the need to begin monitoring activities in these areas. Three management alternatives were considered. However, they are cast in terms of the regulatory process; that is, either a 'comprehensive amendment,' which would incorporate the proposed permitting and monitoring requirements into all existing FMPs, or the preferred alternative in which adjustments (or amendments) are made to each FMP separately; thus this initiative addresses pelagic fisheries only. (The third alternative is no action.) The Council determined that a comprehensive amendment would be time consuming, especially since the PRIAs are not part of the management areas in the Bottomfish and Crustacean FMPs. The preferred alternative would allow regulatory activity to begin for pelagic fishing vessels, which are the main type active in the Remote Areas.

The regulatory amendment (framework adjustment) is an integrated document with the recommended sections necessary to satisfy NEPA requirements. However, the NEPA subsection does not specifically reference the document sections that address the elements of an EIS/EA. (Since the document is under review it is likely that eventually these points will be addressed.) As with other recent Council documents, a seven point list mainly derived from the criteria in NAO 216-6 is used to demonstrate that the action does not trigger an EIS requirement. The FONSI statement and Administrator signature line are also included.

1.2.2 Regulatory Amendment, EA (seabirds)

Title: Measures to Reduce the Incidental Catch of Seabirds in the Hawaii Longline Fishery; A

Framework Adjustment to the Western Pacific Pelagic Fisheries Management Plan

2.2.1 Relevant dates

Document date: December 13, 1999

Under NMFS review

2.2.2 Major regulatory provisions

Other: Two or more of a suite of mitigation measures designed to reduce the inadvertent ooking of seabirds (described in the document), particularly the black-footed albatross *hoebastria nigripes*) and the Laysan albatross (*P. immutabilis*), must be used by longline essels fishing north of 25° N latitude. Proper handling techniques, as described in the document, ust be used to increase the survival of birds that are brought aboard alive after being ensnared fishing gear. Vessel captains must attend an annual protected species educational workshop nducted by the NMFS.

2.2.3 Discussion

Seabirds, especially the two species mentioned above, dive on baited hooks as the ngline is deployed, or less frequently, during haulback. Birds hooked during deployment often own, but those hooked during haulback may survive if they can be released in the proper anner. Analysis of data on seabird incidental catch indicates that it is correlated with location as batrosses tend to fly and forage north or northeast from nesting areas in the NWHI. The quired measures are meant to reduce the incidental catch and subsequent mortality of these rds. Four alternatives were considered to mitigate mortality:

1. No action.
2. The preferred alternative containing the provisions described above in Section 6.2.2.2.
3. An alternative with the provisions of #2 but the Councils selects which mitigation measures will be used.
4. Prohibition of longlining north of 23° N.

A lot of the descriptive material meant to address EA requirements is included under the EPA section (10.1) of the document. As a result, this subsection is actually longer than the ain body of the document. It includes a description of the affected environment, environmental nsequences of alternatives (which discusses the mitigation measures and possible geographic itations) and a description of the impacts of the alternative management measures. It also clude a list of criteria similar to other documents (in this case it contains six points because the ue of controversy is omitted), followed by a FONSI and Administrator's signature line.

In this respect it is organized in a fashion midway between a document that incorporates

NEPA elements and a stand-alone EA/EIS. Like the American Samoa closed area action, described below, this document takes a more explicit approach to satisfying NEPA, but without stand-alone EA.

1.2.3 Regulatory Amendment (Am. Samoa closed area)

Title: Prohibition of fishing for pelagic management unit species within closed areas around the islands of American Samoa by vessels more than 50 feet in length; Framework Measure under the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region

1.2.3.1 Relevant Dates

Document date: January 2000

In preparation

1.2.3.2 Major regulatory provisions

Closed areas: A closed area for domestic fishing vessels over 50 l.o.a. approximately 50 nm from the baselines of Tutuila Island, Rose Atoll and Manu'a Islands and approximately 30 nm from the baseline of Swain's Island is proposed. Closed area boundaries are simplified by the use of straight lines between defined points. Owners with vessels greater than 50 l.o.a. that held an NMFS Longline General Permit on or prior to November 13, 1997 and made a landing of PMUS in American Samoa on or prior to that date are exempt from the prohibition.

Procedural matters: The Council will conduct an annual evaluation of the biological, economic and social impacts of the closed areas.

1.2.3.3 Discussion

This framework measure is being prepared in response to concerns by small boat fishers in American Samoa that larger longline vessels may begin fishing in EEZ because of fleet restrictions elsewhere, particularly in the Hawaii fishery. Four alternatives were considered. Aside from the no action alternative, these were variations on the size and location of the closed area. The preferred alternative, as outlined above, was originally selected by the Council in July 1998 but has not yet (as of May 2000) been implemented. This is because the amendment was rejected by the NMFS Regional Administrator. However, since mid-1998 knowledge and conditions in the fishery have changed somewhat. First, several new vessels (still less than 50 ft) capable of greater range entered the fishery, demonstrating that the local fleet could effectively fish throughout the closed area. Second, catches of albacore at older grounds closer to shore continued to decline but fishermen were finding good fishing farther offshore. Finally, evidence from theoretical models suggests that the impacts of purse seining may be felt at greater stances--up to 600 nm--than was previously thought. In fact, these reasons suggest that a larger, 00 nm closed area might be justified. (This was the size originally desired by American Samoan shers.) Therefor, depending on Council action, there is a possibility that this framework easure may be revised again before implementation.

This document has a stand-alone EA contained in an appendix. The EA is organized ound the standard elements: purpose and need for action, alternatives, affected environment, d environmental consequences of proposed action and alternatives (which is subdivided into iological impacts' and 'economic and social economic impacts' sections.) The other elements--ver sheet, summary, table of contents, list of preparers, and description of public review--are, course, part of the main document. The conclusion and determination section, including ONSI and Administrator signature line is similar to other recent council documents. As would expected, the stand-alone EA approach leads to some degree of redundancy since many of the ements in the EA are also part of the main document, albeit in somewhat different format. On e other hand, a separate EA makes the way in which NEPA requirements are being addressed ry obvious.

2.4 Amendment 9, EA (annual quota for sharks, bottom longlining)

tle: Amendment 9 to the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region; Proposed Actions: 1) Establish an annual harvest guideline for the number of sharks taken in the Hawaii longline fishery 2) Define bottom longline gear and prohibit its use

2.4.1 Relevant dates

Document date: March 2000

In preparation

2.4.2 Major regulatory provisions

Harvest limitation: Initial annual harvest guideline for the number of blue sharks that ay be landed (based on any part thereof) of 50,000. For other species a harvest guideline of one ark per boat per trip, landed whole or dressed, is proposed. In the future the harvest guideline ay be adjusted through the framework adjustment process outlined in Amendment 7.

Gear restriction: Bottom longlining is defined and prohibited in the NWHI and MHI ngline prohibited areas.

2.4.3 Discussion

The amendment document was prepared in response to widespread concerns about the exploitation of oceanic sharks in the region, and in particular, by the Hawaii-based longline flee Finning, where the shark carcass is discarded and only the fins are retained, has become a widespread practice in this fishery (as it is in many foreign high seas fisheries in the western Pacific). Shark fins are a valuable commodity used in the preparation of shark fin soup, an Asian delicacy. The predominant shark caught, the blue shark (*Prionace glauca*), does not keep well o ice and there are no developed markets for the flesh in Hawaii. Thus their carcasses are discarde at sea. The document identifies five issues related to shark management:

1. Regionally, there is inadequate data on shark exploitation.
2. Because of the biological characteristics of sharks, they are vulnerable to over-exploitation.
3. Finning is seen by the public as both wasteful and, by some, cruel because it is believed that sharks are alive during and after the finning process. Some native Hawaiians find killing sharks culturally offensive. Thus exploitation issues are grouped in two subsets: the waste issue and the 'existence value' issue.
4. A bottom longlining fishery conducted in the NWHI during 1998-99 could not be regulated because it fell outside the regulatory definition for longline gear. There are concerns that this fishery may harm the endangered monk seal.
5. Currently oceanic sharks, as pelagic MUS, are defined at the family level. This means that some inshore and coastal species fall under the Pelagic FMP. Management could be improved if the definitions were changed so that only those sharks commonly caught in Pelagic fisheries are PMUS and other species are shifted to appropriate FMPs.

From this set of issues four sets of management alternatives are developed. (It is argued that improved data gathering in Council-managed fisheries can be addressed through administrative processes.) For two of these sets of alternatives--to address waste due to finning and the redefinition of oceanic shark PMUS--the no action alternative is chosen. Thus only two management actions are actually proposed, as reflected in the title, above. The preferred alternative to address concerns about over-exploitation is an annual harvest guideline (quota), initially set at 50,000 blue sharks and one shark per trip for non-blue species (landed whole or dressed), to apply to the landing of sharks in the Hawaii-based longline fishery. Framework procedures would allow the harvest guideline to be adjusted in future years. Bottom longlining i to be defined in regulations and then prohibited in existing longline prohibited areas in the NWHI and MHI. The alternatives outlined in this document are:

- Alternatives to address shark resource sustainability issue:
  1. Harvest guideline and framework adjustment (preferred alternative).
  2. Prohibit the retention and landing of shark products in all Council-managed fisheries and the transshipment of shark products through US-flag Pacific ports.
  3. Prohibit the retention and landing of shark products by the Hawaii-based longline fishery.
  4. Implement an annual quota based on some other measure than the number of landed sharks or sets of fins (e.g., weight).

5. Implement minimum and/or maximum size limits for retained sharks based on reproductive characteristics of different shark species or prohibit the taking of all female sharks.
6. Require more selective gear and/or minimize mortality of released sharks.
7. No action.

Alternatives considered to minimize waste of and harm to sharks:

1. No action (preferred alternative).
2. Prohibit the sale, trade or barter of shark fins.
3. Prohibit the commercial landing or transhippment of shark fins by the Hawaii-based longline fleet without the carcass or a specified percentage of the carcass of each shark.
4. Require a minimum product recovery rate.

Alternatives considered to regulate bottom longlining:

1. Develop a new definition specifically for bottom longline gear and prohibit its use in the longline prohibited areas in the NWHI and MHI (preferred alternative).
2. Amend the existing definition for longline gear so that it includes bottom longline gear and then prohibit the use of this method in the protected species zone in the NWHI.
3. No action.

Alternatives considered to manage sharks under appropriate fishery management plans for each species or species group:

1. No action (preferred alternative).
2. Redefine pelagic MUS to include only those shark species known to be exclusively pelagic and treat other shark species thus excluded as bycatch or redefine them as MUS under other, more appropriate fishery management plans.
3. Include only those shark species known to be frequently caught in the Hawaii-based longline fishery as pelagic MUS. (And redefine any other important species under other plans or continue to treat them as bycatch, as above.)
4. Exclude shark species as pelagic MUS if they are not utilized. (As above, these species would be treated as bycatch, and selected species could be included under other plans, if appropriate.)
5. Include those shark species identified in Alternative 3 and longfin mako shark and salmon shark as pelagic MUS. (As above, treat other species as bycatch or redefine under other FMPs.)

In terms of satisfying NEPA requirements this is an integrated document. The NEPA ion provides a table identifying which sections of the document correspond to EIS/EA ions identified in regulations. The impacts section briefly analyzes each set of alternatives arately for biological, economic and social impacts. As in other recent Council documents, criteria set drawn from NAO 216-6, FONSI, and Administrator's signature line are found in the NEPA subsection of the 'other applicable laws' section of the document.

1.3 Current regulatory framework for management regime

1. Permits:
    - General: longlining and transshipment in U.S. EEZ outside of Hawaii (660.21(a)).
    - Limited entry: longlining and transshipment in Hawaii EEZ (660.21(b)), fees (660.13(f)).
    - Experimental: (660.17).

2. Monitoring:
    - Fishing record forms for longliners (660.14(a)).
    - Transshipment logbooks (660.14(b)).
    - Conditions for at-sea observer coverage (660.28).
    - Reporting under state/territorial law required (660.14(g)).
    - Vessel identification (660.16).
    - Gear identification (660.24).
    - Notifications of departure (660.23(a)), transiting PSZ without VMS (660.23(b))
    - experimental vessel monitoring system (VMS) requires installation at NMFS request for limited entry permit holders, no cost to vessel owner (660.25).

3. Closed Areas (for longliners):
    - Protected species zone (660.12 (definitions) and 660.26(b)).
    - MHI closed areas: Feb.-Sept inclusive (660.26(c)(1)) and Oct.-Jan. inclusive (660.26(c)(2)).
    - Guam: (660.26(d)).
    - Criteria and procedures for exempting individual fisherman from specific closed area restrictions (660.27).
    - Closed area to protect turtles; Hawaii longline vessels may not fish in area; prohibited to land or transship fish caught in closed area cannot be land or (660.22(z)-(bb)).
4. Gear Restrictions:
    - Drift gillnets prohibited (660.30) (but could be allowed under EFP (660.17)).

5. Protected Species:
    - PSZ defined (see closed areas) (660.12 (definitions) and 660.26(b)).

6. Procedural Matters:
    - Framework adjustments to management measures (under procedures outline in Amendment 7 (660.31).

7. Other:
    - U.S. longline vessels without permit may transit WestPac EEZ and dock at ports

but may not offload FMUS (660.29).

APPENDIX M

Projected Outcomes Under the Alternatives.

	Alternative 1			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	74	45	119	0	0	0	0.0	0.0	0.0
Persons on break-even vessels	407	203	610	0	0	0	0.0	0.0	0.0
Effort (sets)	7,128	4,751	11,879	0	0	0	0.0	0.0	0.0
Effort (trips)	714	433	1,148	0	0	0	0.0	0.0	0.0
Trips per break-even vessel	9.7	9.6	9.6	0.0	0.0	0.0	0.0	0.0	0.0
Tuna revenue ($Millions)	19.5	5.2	24.7	0.0	0.0	0.0	0.0	0.0	0.0
Swordfish revenue ($Millions)	0.5	11.3	11.8	0.0	0.0	0.0	0.0	0.0	0.0
Shark revenue ($Millions)	0.4	1.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0
Other PMUS revenue ($milions)	1.7	1.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0
Total revenue ($Millions)	22.1	18.6	40.7	0.0	0.0	0.0	0.0	0.0	0.0
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	0	0	0	0	0	0	0.0	0.0	0.0
Average revenue per break-even vessel ($)	298,000	414,000	342,000	0	0	0	0.0	0.0	0.0
Direct payments to labor ($Mllions)	10.7	9.0	19.7	0.0	0.0	0.0	0.0	0.0	0.0
Direct purchases from local input suppliers ($Millions)	7.7	6.5	14.3	0.0	0.0	0.0	0.0	0.0	0.0
Hawaii total economic impact--direct, indirect, and induced ($Millions)	26.2	22.1	48.3	0.0	0.0	0.0	0.0	0.0	0.0
Total turtle mortality (number)	47	103	150	0	0	0	0.0	0.0	0.0
Total albatross mortality (number)	159	2,077	2,235	0	0	0	0.0	0.0	0.0

Table 1 (continued): Projected Outcomes under Alternative 1

	Alternative 1			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	211.8	5,972.4	6,184.2	0.0	0.0	0.0	0.0	0.0	0.0
Bigeye (thousands of pounds)	4,077.5	1,078.7	5,156.2	0.0	0.0	0.0	0.0	0.0	0.0
Albacore (thousands of pounds)	2,139.1	353.3	2,492.4	0.0	0.0	0.0	0.0	0.0	0.0
Yellowfin (thousands of pounds)	1,005.6	707.0	1,712.6	0.0	0.0	0.0	0.0	0.0	0.0
Blue Shark (thousands of pounds)	565.8	4,903.0	5,468.8	0.0	0.0	0.0	0.0	0.0	0.0
Mako shark (thousands of pounds)	87.7	76.2	163.8	0.0	0.0	0.0	0.0	0.0	0.0
Thresher shark (thousands of pounds)	272.4	31.1	303.6	0.0	0.0	0.0	0.0	0.0	0.0
Blue Marlin (thousands of pounds)	550.2	456.0	1,006.2	0.0	0.0	0.0	0.0	0.0	0.0
Striped Marlin (thousands of pounds)	676.8	252.0	928.9	0.0	0.0	0.0	0.0	0.0	0.0
Total PMUS (thousands of pounds)	9,586.9	13,829.7	23,416.7	0.0	0.0	0.0	0.0	0.0	0.0
Loggerhead Take (number)	23	394	418	0	0	0	0.0	0.0	0.0
Leatherback Take (number)	39	73	112	0	0	0	0.0	0.0	0.0
Ridley Take (number)	109	37	146	0	0	0	0.0	0.0	0.0
Green Take (number)	19	21	40	0	0	0	0.0	0.0	0.0
Take of All Turtle Species (number)	190	526	716	0	0	0	0.0	0.0	0.0
Loggerhead Kill (number)	5	82	87	0	0	0	0.0	0.0	0.0
Leatherback Kill (number)	3	6	9	0	0	0	0.0	0.0	0.0
Ridley Kill (number)	36	12	49	0	0	0	0.0	0.0	0.0
Green Kill (number)	2	3	5	0	0	0	0.0	0.0	0.0
Kill of All Turtle Species (number)	47	103	150	0	0	0	0.0	0.0	0.0
Black footed Albatross Take (number)	128	1,299	1,427	0	0	0	0.0	0.0	0.0
Laysan Albatross Take (number)	54	1,111	1,165	0	0	0	0.0	0.0	0.0
Total Take of Albatross (number)	182	2,410	2,592	0	0	0	0.0	0.0	0.0
Black footed Albatross Kill (number)	115	1,168	1,283	0	0	0	0.0	0.0	0.0
Laysan Albatross Kill (number)	44	908	952	0	0	0	0.0	0.0	0.0

	Alternative 2			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	73	45	118	-1	0	-1	-1.4	0.0	-0.8
Persons on break-even vessels	402	203	605	-5	0	-5	-1.2	0.0	-0.8
Effort (sets)	7,128	4,751	11,879	0	0	0	0.0	0.0	0.0
Effort (trips)	714	433	1,148	0	0	0	0.0	0.0	0.0
Trips per break-even vessel	9.8	9.6	9.7	0.1	0.0	0.1	1.4	0.0	0.8
Tuna revenue ($Millions)	19.7	7.4	27.0	0.2	2.2	2.4	0.8	43.0	9.6
Swordfish revenue ($Millions)	0.4	10.6	11.0	-0.1	-0.7	-0.8	-18.0	-6.5	-7.0
Shark revenue ($Millions)	0.3	0.1	0.3	-0.1	-1.1	-1.3	-36.7	-94.8	-80.3
Other PMUS revenue ($milions)	1.7	0.8	2.5	0.0	-0.1	-0.1	2.8	-15.2	-3.8
Total revenue ($Millions)	22.0	18.8	40.9	-0.0	0.2	0.2	-0.1	1.1	0.4
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	52,346	63,034	115,379	52,346	63,034	115,379	0.0	0.0	0.0
Average revenue per break-even vessel ($)	301,000	417,000	345,000	3,000.0	3,000.0	3,000.0	1.0	0.7	0.9
Direct payments to labor ($Mllions)	10.7	9.1	19.8	-0.0	0.1	0.1	-0.1	1.1	0.4
Direct purchases from local input suppliers ($Millions)	7.7	6.6	14.4	-0.0	0.1	0.1	-0.1	1.1	0.4
Hawaii total economic impact--direct, indirect, and induced ($Millions)	26.2	22.4	48.5	-0.0	0.2	0.2	-0.1	1.1	0.4
Total turtle mortality (number)	47	103	150	0	0	0	0.0	0.0	0.0
Total albatross mortality (number)	15	276	291	-144	-1,800	-1,944	-90.6	-86.7	-87.0

Table 2 (continued): Projected Outcomes under Alternative 2

	Alternative 2			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	173.6	5,661.0	5,834.6	-38.2	-311.4	-349.6	-18.0	-5.2	-5.7
Bigeye (thousands of pounds)	4,108.3	1,098.9	5,207.2	30.8	20.2	51.0	0.8	1.9	1.0
Albacore (thousands of pounds)	2,127.8	340.2	2,468.0	-11.3	-13.1	-24.4	-0.5	-3.7	-1.0
Yellowfin (thousands of pounds)	1,031.8	1,514.6	2,546.4	26.1	807.6	833.7	2.6	114.2	48.7
Blue Shark (thousands of pounds)	81.9	582.9	664.8	-483.9	-4,320.1	-4,804.0	-85.5	-88.1	-87.8
Mako shark (thousands of pounds)	87.7	76.2	163.8	0.0	0.0	0.0	0.0	0.0	0.0
Thresher shark (thousands of pounds)	272.4	31.1	303.6	0.0	0.0	0.0	0.0	0.0	0.0
Blue Marlin (thousands of pounds)	576.3	422.2	998.5	26.1	-33.8	-7.7	4.7	-7.4	-0.8
Striped Marlin (thousands of pounds)	684.4	179.7	864.1	7.6	-72.4	-64.8	1.1	-28.7	-7.0
Total PMUS (thousands of pounds)	9,144.2	9,906.7	19,050.9	-442.8	-3,923.0	-4,365.8	-4.6	-28.4	-18.6
Loggerhead Take (number)	23	394	418	0	0	0	0.0	0.0	0.0
Leatherback Take (number)	39	73	112	0	0	0	0.0	0.0	0.0
Ridley Take (number)	109	37	146	0	0	0	0.0	0.0	0.0
Green Take (number)	19	21	40	0	0	0	0.0	0.0	0.0
Take of All Turtle Species (number)	190	526	716	0	0	0	0.0	0.0	0.0
Loggerhead Kill (number)	5	82	87	0	0	0	0.0	0.0	0.0
Leatherback Kill (number)	3	6	9	0	0	0	0.0	0.0	0.0
Ridley Kill (number)	36	12	49	0	0	0	0.0	0.0	0.0
Green Kill (number)	2	3	5	0	0	0	0.0	0.0	0.0
Kill of All Turtle Species (number)	47	103	150	0	0	0	0.0	0.0	0.0
Black footed Albatross Take (number)	13	156	169	-115	-1,143	-1,258	-90.0	-88.0	-88.2
Laysan Albatross Take (number)	4	167	171	-50	-945	-994	-92.0	-85.0	-85.3
Total Take of Albatross (number)	17	323	340	-165	-2,088	-2,252	-90.6	-86.6	-86.9
Black footed Albatross Kill (number)	11	140	152	-103	-1,028	-1,132	-90.0	-88.0	-88.2
Laysan Albatross Kill (number)	4	136	140	-41	-772	-812	-92.0	-85.0	-85.3
Total Kill of Albatross (number)	15	276	291	-144	-1,800	-1,944	-90.6	-86.7	-87.0

	Alternative 3 with switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	84	4	88	10	-41	-31	13.5	-91.1	-26.1
Persons on break-even vessels	462	18	480	55	-185	-130	13.5	-91.1	-21.3
Effort (sets)	9,088	420	9,508	1,960	-4,331	-2,371	27.5	-91.2	-20.0
Effort (trips)	911	35	946	196	-398	-202	27.5	-91.8	-17.6
Trips per break-even vessel	10.8	8.9	10.7	1.2	-0.8	1.1	12.3	-8.1	11.5
Tuna revenue ($Millions)	23.5	0.3	23.8	4.0	-4.9	-0.9	20.5	-94.9	-3.6
Swordfish revenue ($Millions)	0.5	1.3	1.8	0.0	-10.0	-10.0	0.6	-88.6	-85.1
Shark revenue ($Millions)	0.4	0.2	0.6	0.0	-1.0	-1.0	10.2	-86.3	-62.2
Other PMUS revenue ($milions)	2.0	0.0	2.1	0.4	-0.9	-0.6	21.3	-96.8	-22.0
Total revenue ($Millions)	26.5	1.7	28.2	4.4	-16.9	-12.5	19.9	-90.6	-30.7
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	0	0	0	0	0	0	0.0	0.0	0.0
Average revenue per break-even vessel ($)	315,000	437,000	320,000	17,000	23,000	-22,000	5.7	5.6	-6.4
Direct payments to labor ($Mllions)	12.8	0.8	13.7	2.1	-8.2	-6.0	19.9	-90.6	-30.7
Direct purchases from local input suppliers ($Millions)	9.3	0.6	9.9	1.5	-5.9	-4.4	19.9	-90.6	-30.7
Hawaii total economic impact--direct, indirect, and induced ($Millions)	31.4	2.1	33.5	5.2	-20.1	-14.8	19.9	-90.6	-30.7
Total turtle mortality (number)	58	16	75	12	-87	-76	24.8	-84.4	-50.4
Total albatross mortality (number)	171	261	433	12	-1,815	-1,803	7.8	-87.4	-80.6

Table 3 (continued): Projected Outcomes under Alternative 3 with switching

	Alternative 3 with switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	226.1	720.0	946.1	14.3	-5,252.4	-5,238.1	6.8	-87.9	-84.7
Bigeye (thousands of pounds)	5,174.7	64.6	5,239.3	1,097.2	-1,014.1	83.1	26.9	-94.0	1.6
Albacore (thousands of pounds)	2,819.9	29.9	2,849.8	680.8	-323.4	357.4	31.8	-91.5	14.3
Yellowfin (thousands of pounds)	1,287.7	13.9	1,301.6	282.1	-693.1	-411.0	28.0	-98.0	-24.0
Blue Shark (thousands of pounds)	713.5	726.1	1,439.6	147.7	-4,176.8	-4,029.1	26.1	-85.2	-73.7
Mako shark (thousands of pounds)	111.5	6.9	118.4	23.8	-69.3	-45.5	27.2	-90.9	-27.7
Thresher shark (thousands of pounds)	289.8	1.5	291.3	17.4	-29.7	-12.3	6.4	-95.3	-4.0
Blue Marlin (thousands of pounds)	719.1	9.8	729.0	168.9	-446.2	-277.3	30.7	-97.8	-27.6
Striped Marlin (thousands of pounds)	859.7	10.7	870.5	182.9	-241.3	-58.4	27.0	-95.7	-6.3
Total PMUS (thousands of pounds)	12,202.1	1,583.4	13,785.5	2,615.2	-12,246.3	-9,631.1	27.3	-88.6	-41.1
Loggerhead Take (number)	26	68	94	3	-326	-324	11.8	-82.7	-77.5
Leatherback Take (number)	37	10	47	-1	-64	-65	-3.8	-86.9	-58.2
Ridley Take (number)	141	2	143	32	-35	-3	29.1	-94.7	-2.3
Green Take (number)	24	4	27	5	-18	-13	24.8	-83.2	-32.3
Take of All Turtle Species (number)	228	83	311	38	-443	-405	19.9	-84.2	-56.6
Loggerhead Kill (number)	5	14	20	1	-68	-67	11.8	-82.7	-77.5
Leatherback Kill (number)	3	1	4	-0	-5	-5	-3.8	-86.9	-58.2
Ridley Kill (number)	47	1	48	11	-12	-1	29.1	-94.7	-2.3
Green Kill (number)	3	0	3	1	-2	-2	24.8	-83.2	-32.3
Kill of All Turtle Species (number)	58	16	75	12	-87	-76	24.8	-84.4	-50.4
Black footed Albatross Take (number)	140	160	300	12	-1,139	-1,127	9.4	-87.7	-79.0
Laysan Albatross Take (number)	56	143	199	2	-968	-966	3.8	-87.1	-82.9
Total Take of Albatross (number)	196	304	499	14	-2,107	-2,093	7.7	-87.4	-80.7
Black footed Albatross Kill (number)	125	144	270	11	-1,024	-1,013	9.4	-87.7	-79.0
Laysan Albatross Kill (number)	46	117	163	2	-791	-789	3.8	-87.1	-82.9
Total Kill of Albatross (number)	171	261	433	12	-1,815	-1,803	7.8	-87.4	-80.6

	Alternative 3 without switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	61	4	65	-13	-41	-54	-17.6	-91.1	-45.4
Persons on break-even vessels	336	18	354	-71	-185	-256	-17.4	-91.1	-42.0
Effort (sets)	6,224	420	6,644	-904	-4,331	-5,235	-12.7	-91.2	-44.1
Effort (trips)	624	35	659	-91	-398	-488	-12.7	-91.8	-42.6
Trips per break-even vessel	10.2	8.9	10.1	0.6	-0.8	0.5	5.9	-8.1	5.1
Tuna revenue ($Millions)	16.2	0.3	16.5	-3.3	-4.9	-8.2	-16.9	-94.9	-33.2
Swordfish revenue ($Millions)	0.3	1.3	1.6	-0.2	-10.0	-10.2	-33.7	-88.6	-86.4
Shark revenue ($Millions)	0.3	0.2	0.5	-0.1	-1.0	-1.1	-26.3	-86.3	-71.3
Other PMUS revenue ($milions)	1.4	0.0	1.4	-0.3	-0.9	-1.2	-16.8	-96.8	-46.1
Total revenue ($Millions)	18.2	1.7	20.0	-3.8	-16.9	-20.7	-17.4	-90.6	-50.9
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	0	0	0	0	0	0	0.0	0.0	0.0
Average revenue per break-even vessel ($)	299,000	437,000	307,000	1,000	23,000	-35,000	0.3	5.6	-10.2
Direct payments to labor ($Mllions)	8.8	0.8	9.7	-1.9	-8.2	-10.0	-17.4	-90.6	-50.9
Direct purchases from local input suppliers ($Millions)	6.4	0.6	7.0	-1.3	-5.9	-7.3	-17.4	-90.6	-50.9
Hawaii total economic impact--direct, indirect, and induced ($Millions)	21.6	2.1	23.7	-4.6	-20.1	-24.6	-17.4	-90.6	-50.9
Total turtle mortality (number)	40	16	56	-7	-87	-94	-14.8	-84.4	-62.7
Total albatross mortality (number)	117	261	379	-42	-1,815	-1,857	-26.2	-87.4	-83.1

Table 4 (continued): Projected Outcomes under Alternative 3 without switching

	Alternative 3 without switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	150.4	720.0	870.4	-61.4	-5,252.4	-5,313.8	-29.0	-87.9	-85.9
Bigeye (thousands of pounds)	3,667.1	64.6	3,731.6	-410.4	-1,014.1	-1,424.6	-10.1	-94.0	-27.6
Albacore (thousands of pounds)	1,867.1	29.9	1,896.9	-272.0	-323.4	-595.4	-12.7	-91.5	-23.9
Yellowfin (thousands of pounds)	870.7	13.9	884.6	-135.0	-693.1	-828.1	-13.4	-98.0	-48.4
Blue Shark (thousands of pounds)	487.9	726.1	1,214.0	-77.9	-4,176.8	-4,254.7	-13.8	-85.2	-77.8
Mako shark (thousands of pounds)	76.1	6.9	83.0	-11.6	-69.3	-80.8	-13.2	-90.9	-49.3
Thresher shark (thousands of pounds)	192.4	1.5	193.9	-80.0	-29.7	-109.7	-29.4	-95.3	-36.1
Blue Marlin (thousands of pounds)	489.6	9.8	499.4	-60.6	-446.2	-506.8	-11.0	-97.8	-50.4
Striped Marlin (thousands of pounds)	604.7	10.7	615.5	-72.1	-241.3	-313.4	-10.7	-95.7	-33.7
Total PMUS (thousands of pounds)	8,405.9	1,583.4	9,989.3	-1,181.0	-12,246.3	-13,427.3	-12.3	-88.6	-57.3
Loggerhead Take (number)	18	68	86	-6	-326	-332	-24.0	-82.7	-79.5
Leatherback Take (number)	25	10	34	-14	-64	-78	-36.0	-86.9	-69.3
Ridley Take (number)	96	2	98	-13	-35	-48	-11.6	-94.7	-32.7
Green Take (number)	16	4	20	-3	-18	-20	-15.0	-83.2	-51.1
Take of All Turtle Species (number)	155	83	238	-35	-443	-478	-18.4	-84.2	-66.7
Loggerhead Kill (number)	4	14	18	-1	-68	-69	-24.0	-82.7	-79.5
Leatherback Kill (number)	2	1	3	-1	-5	-6	-36.0	-86.9	-69.3
Ridley Kill (number)	32	1	33	-4	-12	-16	-11.6	-94.7	-32.7
Green Kill (number)	2	0	3	-0	-2	-3	-15.0	-83.2	-51.1
Kill of All Turtle Species (number)	40	16	56	-7	-87	-94	-14.8	-84.4	-62.7
Black footed Albatross Take (number)	95	160	256	-32	-1,139	-1,171	-25.2	-87.7	-82.1
Laysan Albatross Take (number)	38	143	182	-16	-968	-984	-28.8	-87.1	-84.4
Total Take of Albatross (number)	134	304	437	-48	-2,107	-2,155	-26.3	-87.4	-83.1
Black footed Albatross Kill (number)	86	144	230	-29	-1,024	-1,053	-25.2	-87.7	-82.1
Laysan Albatross Kill (number)	31	117	148	-13	-791	-804	-28.8	-87.1	-84.4

	Alternative 4			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	73	42	115	-1	-3	-4	-1.4	-6.7	-3.4
Persons on break-even vessels	402	189	591	-5	-14	-19	-1.2	-6.9	-3.1
Effort (sets)	7,128	4,751	11,879	-0	0	0	-0.0	0.0	0.0
Effort (trips)	714	433	1,148	-0	0	0	-0.0	0.0	0.0
Trips per break-even vessel	9.8	10.3	10.0	0.1	0.7	0.3	1.4	7.1	3.5
Tuna revenue ($Millions)	19.5	6.7	26.3	0.0	1.6	1.6	0.1	30.6	6.5
Swordfish revenue ($Millions)	0.4	9.5	10.0	-0.0	-1.8	-1.8	-7.4	-15.8	-15.5
Shark revenue ($Millions)	0.3	0.1	0.3	-0.1	-1.1	-1.3	-36.5	-94.6	-80.1
Other PMUS revenue ($milions)	1.7	1.4	3.1	0.0	0.4	0.4	0.1	46.0	16.9
Total revenue ($Millions)	21.9	17.7	39.6	-0.2	-0.9	-1.1	-0.7	-4.8	-2.6
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	38,163	74,716	112,878	38,163	74,716	112,878	0.0	0.0	0.0
Average revenue per break-even vessel ($)	300,000	421,000	344,000	2,000	7,000	2,000	0.7	1.7	0.6
Direct payments to labor ($Mllions)	10.6	8.6	19.2	-0.1	-0.4	-0.5	-0.7	-4.8	-2.6
Direct purchases from local input suppliers ($Millions)	7.7	6.2	13.9	-0.1	-0.3	-0.4	-0.7	-4.8	-2.6
Hawaii total economic impact--direct, indirect, and induced ($Millions)	26.0	21.1	47.1	-0.2	-1.1	-1.2	-0.7	-4.8	-2.6
Total turtle mortality (number)	46	63	110	-1	-40	-41	-1.4	-38.6	-27.0
Total albatross mortality (number)	11	210	221	-148	-1,866	-2,014	-93.2	-89.9	-90.1

Table 5 (continued): Projected Outcomes under Alternative 4

	Alternative 4			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	196.1	4,731.0	4,927.1	-15.7	-1,241.4	-1,257.1	-7.4	-20.8	-20.3
Bigeye (thousands of pounds)	4,075.7	1,374.3	5,450.0	-1.8	295.6	293.8	-0.0	27.4	5.7
Albacore (thousands of pounds)	2,152.0	303.9	2,455.9	13.0	-49.4	-36.4	0.6	-14.0	-1.5
Yellowfin (thousands of pounds)	1,008.8	870.8	1,879.5	3.1	163.7	166.9	0.3	23.2	9.7
Blue Shark (thousands of pounds)	82.2	514.7	596.9	-483.6	-4,388.3	-4,871.9	-85.5	-89.5	-89.1
Mako shark (thousands of pounds)	87.5	67.3	154.8	-0.2	-8.9	-9.0	-0.2	-11.6	-5.5
Thresher shark (thousands of pounds)	273.4	45.0	318.5	1.0	13.9	14.9	0.4	44.7	4.9
Blue Marlin (thousands of pounds)	550.3	702.4	1,252.7	0.0	246.4	246.4	0.0	54.0	24.5
Striped Marlin (thousands of pounds)	678.5	298.7	977.3	1.7	46.7	48.4	0.2	18.5	5.2
Total PMUS (thousands of pounds)	9,104.6	8,908.1	18,012.6	-482.4	-4,921.6	-5,404.0	-5.0	-35.6	-23.1
Loggerhead Take (number)	19	198	218	-4	-196	-200	-16.2	-49.7	-47.9
Leatherback Take (number)	38	52	91	-0	-21	-21	-0.6	-28.9	-19.1
Ridley Take (number)	110	46	156	1	9	10	0.5	24.4	6.5
Green Take (number)	19	19	38	-0	-2	-2	-0.3	-11.4	-6.1
Take of All Turtle Species (number)	186	315	502	-4	-211	-214	-1.9	-40.1	-29.9
Loggerhead Kill (number)	4	41	45	-1	-41	-42	-16.2	-49.7	-47.9
Leatherback Kill (number)	3	4	8	-0	-2	-2	-0.6	-28.9	-19.1
Ridley Kill (number)	36	15	52	0	3	3	0.5	24.4	6.5
Green Kill (number)	2	2	5	-0	-0	-0	-0.3	-11.4	-6.1
Kill of All Turtle Species (number)	46	63	110	-1	-40	-41	-1.4	-38.6	-27.0
Black footed Albatross Take (number)	9	133	142	-119	-1,166	-1,285	-93.2	-89.7	-90.1
Laysan Albatross Take (number)	4	111	115	-50	-1,000	-1,051	-93.3	-90.0	-90.2
Total Take of Albatross (number)	12	244	256	-169	-2,166	-2,336	-93.2	-89.9	-90.1
Black footed Albatross Kill (number)	8	120	128	-107	-1,049	-1,156	-93.2	-89.7	-90.1
Laysan Albatross Kill (number)	3	91	94	-41	-817	-859	-93.3	-90.0	-90.2

	Alternative 5 with switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	110	0	110	36	-45	-9	48.6	-100.0	-7.6
Persons on break-even vessels	605	0	605	198	-203	-5	48.6	-100.0	-0.8
Effort (sets)	11,879	0	11,879	4,751	-4,751	0	66.7	-100.0	0.0
Effort (trips)	1,190	0	1,190	476	-433	43	66.7	-100.0	3.7
Trips per break-even vessel	10.8	0.0	10.8	1.2	-9.6	1.2	12.1	-100.0	12.2
Tuna revenue ($Millions)	32.7	0.0	32.7	13.2	-5.2	8.0	67.5	-100.0	32.5
Swordfish revenue ($Millions)	1.1	0.0	1.1	0.7	-11.3	-10.7	142.0	-100.0	-90.4
Shark revenue ($Millions)	0.5	0.0	0.5	0.1	-1.2	-1.1	15.7	-100.0	-71.2
Other PMUS revenue ($milions)	3.1	0.0	3.1	1.4	-1.0	0.4	83.3	-100.0	16.2
Total revenue ($Millions)	37.4	0.0	37.4	15.3	-18.6	-3.3	69.3	-100.0	-8.2
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	172,366	0	172,366	172,366	0	172,366	0.0	0.0	0.0
Average revenue per break-even vessel ($)	338,000	0	338,000	40,000	-414,000	-4,000	13.4	-100.0	-1.2
Direct payments to labor ($Mllions)	18.1	0.0	18.1	7.4	-9.0	-1.6	69.3	-100.0	-8.2
Direct purchases from local input suppliers ($Millions)	13.1	0.0	13.1	5.4	-6.5	-1.2	69.3	-100.0	-8.2
Hawaii total economic impact--direct, indirect, and induced ($Millions)	44.3	0.0	44.3	18.2	-22.1	-4.0	69.3	-100.0	-8.2
Total turtle mortality (number)	37	0	37	-9	-103	-113	-20.0	-100.0	-75.1
Total albatross mortality (number)	22	0	22	-136	-2,077	-2,213	-85.9	-100.0	-99.0

Table 6 (continued): Projected Outcomes under Alternative 5 with switching

	Alternative 5 with switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	490.9	0.0	490.9	279.1	-5,972.4	-5,693.2	131.8	-100.0	-92.1
Bigeye (thousands of pounds)	6,368.5	0.0	6,368.5	2,291.0	-1,078.7	1,212.3	56.2	-100.0	23.5
Albacore (thousands of pounds)	3,556.3	0.0	3,556.3	1,417.3	-353.3	1,064.0	66.3	-100.0	42.7
Yellowfin (thousands of pounds)	1,772.5	0.0	1,772.5	766.9	-707.0	59.9	76.3	-100.0	3.5
Blue Shark (thousands of pounds)	170.3	0.0	170.3	-395.4	-4,903.0	-5,298.4	-69.9	-100.0	-96.9
Mako shark (thousands of pounds)	155.6	0.0	155.6	67.9	-76.2	-8.3	77.4	-100.0	-5.1
Thresher shark (thousands of pounds)	474.6	0.0	474.6	202.1	-31.1	171.0	74.2	-100.0	56.3
Blue Marlin (thousands of pounds)	1,056.1	0.0	1,056.1	505.9	-456.0	49.9	91.9	-100.0	5.0
Striped Marlin (thousands of pounds)	1,087.1	0.0	1,087.1	410.3	-252.0	158.2	60.6	-100.0	17.0
Total PMUS (thousands of pounds)	15,132.0	0.0	15,132.0	5,545.0	-13,829.7	-8,284.7	57.8	-100.0	-35.4
Loggerhead Take (number)	0	0	0	-23	-394	-418	-100.0	-100.0	-100.0
Leatherback Take (number)	56	0	56	17	-73	-57	43.5	-100.0	-50.4
Ridley Take (number)	90	0	90	-19	-37	-57	-17.8	-100.0	-38.7
Green Take (number)	23	0	23	4	-21	-17	21.5	-100.0	-42.8
Take of All Turtle Species (number)	168	0	168	-22	-526	-548	-11.4	-100.0	-76.5
Loggerhead Kill (number)	0	0	0	-5	-82	-87	-100.0	-100.0	-100.0
Leatherback Kill (number)	5	0	5	1	-6	-5	43.5	-100.0	-50.4
Ridley Kill (number)	30	0	30	-6	-12	-19	-17.8	-100.0	-38.7
Green Kill (number)	3	0	3	1	-3	-2	21.5	-100.0	-42.8
Kill of All Turtle Species (number)	37	0	37	-9	-103	-113	-20.0	-100.0	-75.1
Black footed Albatross Take (number)	18	0	18	-110	-1,299	-1,409	-86.1	-100.0	-98.8
Laysan Albatross Take (number)	8	0	8	-46	-1,111	-1,157	-85.2	-100.0	-99.3
Total Take of Albatross (number)	26	0	26	-156	-2,410	-2,566	-85.9	-100.0	-99.0
Black footed Albatross Kill (number)	16	0	16	-99	-1,168	-1,267	-86.1	-100.0	-98.8
Laysan Albatross Kill (number)	7	0	7	-38	-908	-946	-85.2	-100.0	-99.3

	Alternative 5 without switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	78	0	78	4	-45	-41	5.4	-100.0	-34.5
Persons on break-even vessels	429	0	429	22	-203	-181	5.4	-100.0	-29.7
Effort (sets)	7,640	0	7,640	512	-4,751	-4,239	7.2	-100.0	-35.7
Effort (trips)	766	0	766	51	-433	-382	7.2	-100.0	-33.3
Trips per break-even vessel	9.8	0.0	9.8	0.2	-9.6	0.2	1.7	-100.0	1.8
Tuna revenue ($Millions)	20.9	0.0	20.9	1.4	-5.2	-3.8	7.0	-100.0	-15.3
Swordfish revenue ($Millions)	0.7	0.0	0.7	0.2	-11.3	-11.1	45.3	-100.0	-94.2
Shark revenue ($Millions)	0.3	0.0	0.3	-0.1	-1.2	-1.3	-31.5	-100.0	-82.9
Other PMUS revenue ($milions)	2.0	0.0	2.0	0.3	-1.0	-0.7	17.8	-100.0	-25.4
Total revenue ($Millions)	23.8	0.0	23.8	1.8	-18.6	-16.9	8.0	-100.0	-41.5
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	56,086	0	56,086	56,086	0	56,086	0.0	0.0	0.0
Average revenue per break-even vessel ($)	305,000	0	305,000	7,000	-414,000	-37,000	2.3	-100.0	-10.8
Direct payments to labor ($Mllions)	11.5	0.0	11.5	0.8	-9.0	-8.2	8.0	-100.0	-41.5
Direct purchases from local input suppliers ($Millions)	8.4	0.0	8.4	0.6	-6.5	-5.9	8.0	-100.0	-41.5
Hawaii total economic impact--direct, indirect, and induced ($Millions)	28.3	0.0	28.3	2.1	-22.1	-20.0	8.0	-100.0	-41.5
Total turtle mortality (number)	22	0	22	-25	-103	-128	-53.1	-100.0	-85.4
Total albatross mortality (number)	14	0	14	-145	-2,077	-2,222	-91.4	-100.0	-99.4

Table 7 (continued): Projected Outcomes under Alternative 5 without Switching

	Alternative 5 without Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	301.5	0.0	301.5	89.7	-5,972.4	-5,882.7	42.4	-100.0	-95.1
Bigeye (thousands of pounds)	4,252.7	0.0	4,252.7	175.2	-1,078.7	-903.5	4.3	-100.0	-17.5
Albacore (thousands of pounds)	2,184.9	0.0	2,184.9	45.8	-353.3	-307.5	2.1	-100.0	-12.3
Yellowfin (thousands of pounds)	1,118.2	0.0	1,118.2	112.5	-707.0	-594.5	11.2	-100.0	-34.7
Blue Shark (thousands of pounds)	111.6	0.0	111.6	-454.2	-4,903.0	-5,357.2	-80.3	-100.0	-98.0
Mako shark (thousands of pounds)	97.8	0.0	97.8	10.2	-76.2	-66.0	11.6	-100.0	-40.3
Thresher shark (thousands of pounds)	283.3	0.0	283.3	10.9	-31.1	-20.2	4.0	-100.0	-6.7
Blue Marlin (thousands of pounds)	692.0	0.0	692.0	141.7	-456.0	-314.3	25.8	-100.0	-31.2
Striped Marlin (thousands of pounds)	716.9	0.0	716.9	40.1	-252.0	-211.9	5.9	-100.0	-22.8
Total PMUS (thousands of pounds)	9,758.8	0.0	9,758.8	171.9	-13,829.7	-13,657.8	1.8	-100.0	-58.3
Loggerhead Take (number)	0	0	0	-23	-394	-418	-100.0	-100.0	-100.0
Leatherback Take (number)	31	0	31	-7	-73	-81	-19.0	-100.0	-72.0
Ridley Take (number)	53	0	53	-56	-37	-93	-51.2	-100.0	-63.6
Green Take (number)	13	0	13	-6	-21	-27	-33.0	-100.0	-68.4
Take of All Turtle Species (number)	97	0	97	-93	-526	-619	-48.8	-100.0	-86.4
Loggerhead Kill (number)	0	0	0	-5	-82	-87	-100.0	-100.0	-100.0
Leatherback Kill (number)	3	0	3	-1	-6	-7	-19.0	-100.0	-72.0
Ridley Kill (number)	18	0	18	-19	-12	-31	-51.2	-100.0	-63.6
Green Kill (number)	2	0	2	-1	-3	-4	-33.0	-100.0	-68.4
Kill of All Turtle Species (number)	22	0	22	-25	-103	-128	-53.1	-100.0	-85.4
Black footed Albatross Take (number)	11	5	15	-117	-1,295	-1,411	-91.6	-99.6	-98.9
Laysan Albatross Take (number)	5	0	5	-49	-1,111	-1,160	-91.0	-100.0	-99.6
Total Take of Albatross (number)	16	5	20	-166	-2,406	-2,572	-91.4	-99.8	-99.2
Black footed Albatross Kill (number)	10	0	10	-105	-1,168	-1,274	-91.6	-100.0	-99.3
Laysan Albatross Kill (number)	4	0	4	-40	-908	-948	-91.0	-100.0	-99.6

	Alternative 6			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	57	29	86	-17	-16	-33	-23.0	-35.6	-27.7
Persons on break-even vessels	314	131	445	-93	-72	-165	-22.9	-35.5	-27.0
Effort (sets)	5,533	3,150	8,682	-1,595	-1,601	-3,197	-22.4	-33.7	-26.9
Effort (trips)	554	286	840	-160	-147	-307	-22.4	-34.0	-26.8
Trips per break-even vessel	9.7	9.9	9.8	0.1	0.2	0.1	0.8	2.4	1.3
Tuna revenue ($Millions)	15.4	6.2	21.6	-4.1	1.0	-3.1	-21.0	19.9	-12.5
Swordfish revenue ($Millions)	0.2	4.8	5.0	-0.2	-6.6	-6.8	-52.6	-58.0	-57.8
Shark revenue ($Millions)	0.2	0.0	0.2	-0.2	-1.2	-1.4	-59.2	-96.9	-87.5
Other PMUS revenue ($milions)	1.3	1.0	2.3	-0.4	0.1	-0.3	-24.5	8.0	-12.6
Total revenue ($Millions)	17.1	12.0	29.1	-5.0	-6.6	-11.6	-22.7	-35.5	-28.6
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	24,866	50,020	74,886	24,866	50,020	74,886	0.0	0.0	0.0
Average revenue per break-even vessel ($)	299,000	413,000	337,000	1,000	-1,000	-5,000	0.3	-0.2	-1.5
Direct payments to labor ($Mllions)	8.3	5.8	14.1	-2.4	-3.2	-5.6	-22.7	-35.5	-28.6
Direct purchases from local input suppliers ($Millions)	6.0	4.2	10.2	-1.8	-2.3	-4.1	-22.7	-35.5	-28.6
Hawaii total economic impact--direct, indirect, and induced ($Millions)	20.3	14.3	34.5	-5.9	-7.9	-13.8	-22.7	-35.5	-28.6
Total turtle mortality (number)	35	42	77	-12	-62	-73	-25.3	-59.6	-48.9
Total albatross mortality (number)	11	210	221	-148	-1,866	-2,014	-93.2	-89.9	-90.1

Table 8 (continued): Projected Outcomes under Alternative 6

	Alternative 6			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	105.0	2,249.9	2,355.0	-106.8	-3,722.4	-3,829.2	-50.4	-62.3	-61.9
Bigeye (thousands of pounds)	3,599.1	1,245.5	4,844.5	-478.4	166.8	-311.7	-11.7	15.5	-6.0
Albacore (thousands of pounds)	1,282.3	268.8	1,551.1	-856.8	-84.5	-941.3	-40.1	-23.9	-37.8
Yellowfin (thousands of pounds)	804.0	598.9	1,402.8	-201.7	-108.2	-309.8	-20.1	-15.3	-18.1
Blue Shark (thousands of pounds)	63.5	314.6	378.1	-502.3	-4,588.3	-5,090.7	-88.8	-93.6	-93.1
Mako shark (thousands of pounds)	72.9	29.5	102.4	-14.8	-46.7	-61.4	-16.8	-61.2	-37.5
Thresher shark (thousands of pounds)	168.4	30.0	198.4	-104.0	-1.2	-105.2	-38.2	-3.7	-34.6
Blue Marlin (thousands of pounds)	417.1	531.6	948.7	-133.1	75.6	-57.5	-24.2	16.6	-5.7
Striped Marlin (thousands of pounds)	554.2	167.2	721.3	-122.7	-84.9	-207.5	-18.1	-33.7	-22.3
Total PMUS (thousands of pounds)	7,066.3	5,436.0	12,502.3	-2,520.6	-8,393.7	-10,914.3	-26.3	-60.7	-46.6
Loggerhead Take (number)	18	137	154	-5	-258	-263	-23.4	-65.3	-63.0
Leatherback Take (number)	15	10	25	-24	-63	-87	-61.4	-86.0	-77.5
Ridley Take (number)	85	33	118	-24	-4	-29	-22.3	-11.2	-19.5
Green Take (number)	14	12	25	-5	-9	-15	-26.7	-44.9	-36.3
Take of All Turtle Species (number)	131	192	323	-59	-335	-393	-30.9	-63.6	-54.9
Loggerhead Kill (number)	4	28	32	-1	-54	-55	-23.4	-65.3	-63.0
Leatherback Kill (number)	1	1	2	-2	-5	-7	-61.4	-86.0	-77.5
Ridley Kill (number)	28	11	39	-8	-1	-9	-22.3	-11.2	-19.5
Green Kill (number)	2	2	3	-1	-1	-2	-26.7	-44.9	-36.3
Kill of All Turtle Species (number)	35	42	77	-12	-62	-73	-25.3	-59.6	-48.9
Black footed Albatross Take (number)	9	133	142	-119	-1,166	-1,285	-93.2	-89.7	-90.1
Laysan Albatross Take (number)	4	111	115	-50	-1,000	-1,051	-93.3	-90.0	-90.2
Total Take of Albatross (number)	12	244	256	-169	-2,166	-2,336	-93.2	-89.9	-90.1
Black footed Albatross Kill (number)	8	120	128	-107	-1,049	-1,156	-93.2	-89.7	-90.1
Laysan Albatross Kill (number)	3	91	94	-41	-817	-859	-93.3	-90.0	-90.2

Table 9: Projected Outcomes under Alternative 7 with Switching

	Alternative 7 with Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	98	0	98	24	-45	-21	32.4	-100.0	-17.6
Persons on break-even vessels	539	0	539	132	-203	-71	32.4	-100.0	-11.6
Effort (sets)	10,692	0	10,692	3,564	-4,751	-1,187	50.0	-100.0	-10.0
Effort (trips)	1,071	0	1,071	357	-433	-76	50.0	-100.0	-6.6
Trips per break-even vessel	10.9	0.0	10.9	1.3	-9.6	1.3	13.3	-100.0	13.4
Tuna revenue ($Millions)	28.2	0.0	28.2	8.7	-5.2	3.5	44.5	-100.0	14.3
Swordfish revenue ($Millions)	1.0	0.0	1.0	0.5	-11.3	-10.8	106.7	-100.0	-91.8
Shark revenue ($Millions)	0.3	0.0	0.3	-0.0	-1.2	-1.2	-12.3	-100.0	-78.2
Other PMUS revenue ($milions)	2.6	0.0	2.6	0.9	-1.0	-0.0	56.2	-100.0	-1.0
Total revenue ($Millions)	32.1	0.0	32.1	10.1	-18.6	-8.6	45.7	-100.0	-21.0
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	129,110	0	129,110	129,110	0	129,110	0.0	0.0	0.0
Average revenue per break-even vessel ($)	327,000	0	327,000	29,000	-414,000	-15,000	9.7	-100.0	-4.4
Direct payments to labor ($Mllions)	15.6	0.0	15.6	4.9	-9.0	-4.1	45.7	-100.0	-21.0
Direct purchases from local input suppliers ($Millions)	11.3	0.0	11.3	3.5	-6.5	-3.0	45.7	-100.0	-21.0
Hawaii total economic impact--direct, indirect, and induced ($Millions)	38.2	0.0	38.2	12.0	-22.1	-10.2	45.7	-100.0	-21.0
Total turtle mortality (number)	31	0	31	-16	-103	-119	-33.5	-100.0	-79.3
Total albatross mortality (number)	20	0	20	-139	-2,077	-2,216	-87.6	-100.0	-99.1

Table 9 (continued): Projected Outcomes under Alternative 7 with Switching

	Alternative 7 with Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	441.9	0.0	441.9	230.1	-5,972.4	-5,742.3	108.6	-100.0	-92.9
Bigeye (thousands of pounds)	5,844.7	0.0	5,844.7	1,767.2	-1,078.7	688.5	43.3	-100.0	13.4
Albacore (thousands of pounds)	3,133.0	0.0	3,133.0	993.9	-353.3	640.6	46.5	-100.0	25.7
Yellowfin (thousands of pounds)	1,601.9	0.0	1,601.9	596.3	-707.0	-110.7	59.3	-100.0	-6.5
Blue Shark (thousands of pounds)	160.8	0.0	160.8	-405.0	-4,903.0	-5,308.0	-71.6	-100.0	-97.1
Mako shark (thousands of pounds)	140.4	0.0	140.4	52.8	-76.2	-23.4	60.2	-100.0	-14.3
Thresher shark (thousands of pounds)	361.1	0.0	361.1	88.7	-31.1	57.6	32.6	-100.0	19.0
Blue Marlin (thousands of pounds)	962.3	0.0	962.3	412.0	-456.0	-44.0	74.9	-100.0	-4.4
Striped Marlin (thousands of pounds)	960.2	0.0	960.2	283.4	-252.0	31.4	41.9	-100.0	3.4
Total PMUS (thousands of pounds)	13,606.3	0.0	13,606.3	4,019.3	-13,829.7	-9,810.4	41.9	-100.0	-41.9
Loggerhead Take (number)	0	0	0	-23	-394	-418	-100.0	-100.0	-100.0
Leatherback Take (number)	27	0	27	-12	-73	-86	-31.3	-100.0	-76.3
Ridley Take (number)	85	0	85	-25	-37	-62	-22.6	-100.0	-42.2
Green Take (number)	6	0	6	-13	-21	-34	-68.9	-100.0	-85.4
Take of All Turtle Species (number)	117	0	117	-73	-526	-599	-38.4	-100.0	-83.7
Loggerhead Kill (number)	0	0	0	-5	-82	-87	-100.0	-100.0	-100.0
Leatherback Kill (number)	2	0	2	-1	-6	-7	-31.3	-100.0	-76.3
Ridley Kill (number)	28	0	28	-8	-12	-21	-22.6	-100.0	-42.2
Green Kill (number)	1	0	1	-2	-3	-4	-68.9	-100.0	-85.4
Kill of All Turtle Species (number)	31	0	31	-16	-103	-119	-33.5	-100.0	-79.3
Black footed Albatross Take (number)	15	0	15	-112	-1,299	-1,412	-88.0	-100.0	-98.9
Laysan Albatross Take (number)	7	0	7	-47	-1,111	-1,158	-86.7	-100.0	-99.4
Total Take of Albatross (number)	22	0	22	-159	-2,410	-2,570	-87.6	-100.0	-99.1
Black footed Albatross Kill (number)	14	0	14	-101	-1,168	-1,269	-88.0	-100.0	-98.9
Laysan Albatross Kill (number)	6	0	6	-38	-908	-946	-86.7	-100.0	-99.4

Table 10: Projected Outcomes under Alternative 7 without Switching

	Alternative 7 without Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	72	0	72	-2	-45	-47	-2.7	-100.0	-39.5
Persons on break-even vessels	396	0	396	-11	-203	-214	-2.7	-100.0	-35.1
Effort (sets)	7,015	0	7,015	-113	-4,751	-4,864	-1.6	-100.0	-40.9
Effort (trips)	703	0	703	-11	-433	-445	-1.6	-100.0	-38.7
Trips per break-even vessel	9.8	0.0	9.8	0.1	-9.6	0.1	1.2	-100.0	1.2
Tuna revenue ($Millions)	18.9	0.0	18.9	-0.6	-5.2	-5.8	-3.1	-100.0	-23.3
Swordfish revenue ($Millions)	0.6	0.0	0.6	0.1	-11.3	-11.2	26.6	-100.0	-95.0
Shark revenue ($Millions)	0.2	0.0	0.2	-0.2	-1.2	-1.4	-42.5	-100.0	-85.7
Other PMUS revenue ($milions)	1.8	0.0	1.8	0.1	-1.0	-0.9	6.6	-100.0	-32.5
Total revenue ($Millions)	21.5	0.0	21.5	-0.5	-18.6	-19.2	-2.4	-100.0	-47.1
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	34,485	0	34,485	34,485	0	34,485	0.0	0.0	0.0
Average revenue per break-even vessel ($)	298,000	0	298,000	0	-414,000	-44,000	0.0	-100.0	-12.9
Direct payments to labor ($Mllions)	10.4	0.0	10.4	-0.3	-9.0	-9.3	-2.4	-100.0	-47.1
Direct purchases from local input suppliers ($Millions)	7.6	0.0	7.6	-0.2	-6.5	-6.7	-2.4	-100.0	-47.1
Hawaii total economic impact--direct, indirect, and induced ($Millions)	25.6	0.0	25.6	-0.6	-22.1	-22.8	-2.4	-100.0	-47.1
Total turtle mortality (number)	19	0	19	-28	-103	-132	-60.3	-100.0	-87.6
Total albatross mortality (number)	12	0	12	-147	-2,077	-2,223	-92.3	-100.0	-99.5

Table 10 (continued): Projected Outcomes under Alternative 7 without Switching

	Alternative 7 without Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	269.2	0.0	269.2	57.3	-5,972.4	-5,915.0	27.1	-100.0	-95.6
Bigeye (thousands of pounds)	3,989.8	0.0	3,989.8	-87.7	-1,078.7	-1,166.4	-2.2	-100.0	-22.6
Albacore (thousands of pounds)	1,944.9	0.0	1,944.9	-194.2	-353.3	-547.5	-9.1	-100.0	-22.0
Yellowfin (thousands of pounds)	1,027.5	0.0	1,027.5	21.9	-707.0	-685.1	2.2	-100.0	-40.0
Blue Shark (thousands of pounds)	105.1	0.0	105.1	-460.7	-4,903.0	-5,363.6	-81.4	-100.0	-98.1
Mako shark (thousands of pounds)	89.3	0.0	89.3	1.7	-76.2	-74.5	1.9	-100.0	-45.5
Thresher shark (thousands of pounds)	238.1	0.0	238.1	-34.4	-31.1	-65.5	-12.6	-100.0	-21.6
Blue Marlin (thousands of pounds)	643.1	0.0	643.1	92.9	-456.0	-363.1	16.9	-100.0	-36.1
Striped Marlin (thousands of pounds)	662.8	0.0	662.8	-14.0	-252.0	-266.1	-2.1	-100.0	-28.6
Total PMUS (thousands of pounds)	8,969.8	0.0	8,969.8	-617.1	-13,829.7	-14,446.8	-6.4	-100.0	-61.7
Loggerhead Take (number)	0	0	0	-23	-394	-418	-100.0	-100.0	-100.0
Leatherback Take (number)	23	0	23	-16	-73	-89	-41.0	-100.0	-79.6
Ridley Take (number)	47	0	47	-62	-37	-99	-57.1	-100.0	-67.9
Green Take (number)	8	0	8	-11	-21	-32	-56.8	-100.0	-79.6
Take of All Turtle Species (number)	78	0	78	-112	-526	-638	-59.0	-100.0	-89.1
Loggerhead Kill (number)	0	0	0	-5	-82	-87	-100.0	-100.0	-100.0
Leatherback Kill (number)	2	0	2	-1	-6	-7	-41.0	-100.0	-79.6
Ridley Kill (number)	16	0	16	-21	-12	-33	-57.1	-100.0	-67.9
Green Kill (number)	1	0	1	-1	-3	-4	-56.8	-100.0	-79.6
Kill of All Turtle Species (number)	19	0	19	-28	-103	-132	-60.3	-100.0	-87.6
Black footed Albatross Take (number)	10	0	10	-118	-1,299	-1,417	-92.5	-100.0	-99.3
Laysan Albatross Take (number)	4	0	4	-50	-1,111	-1,161	-91.8	-100.0	-99.6
Total Take of Albatross (number)	14	0	14	-168	-2,410	-2,578	-92.3	-100.0	-99.5
Black footed Albatross Kill (number)	9	0	9	-106	-1,168	-1,275	-92.5	-100.0	-99.3
Laysan Albatross Kill (number)	4	0	4	-41	-908	-949	-91.8	-100.0	-99.6
Total Kill of Albatross (number)	12	0	12	-147	-2,077	-2,223	-92.3	-100.0	-99.5

Table 11: Projected Outcomes under Alternative 8

	Alternative 8			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	0	0	0	-74	-45	-119	-100.0	-100.0	-100.0
Persons on break-even vessels	0	0	0	-407	-203	-610	-100.0	-100.0	-100.0
Effort (sets)	0	0	0	-7,128	-4,751	-11,879	-100.0	-100.0	-100.0
Effort (trips)	0	0	0	-714	-433	-1,148	-100.0	-100.0	-100.0
Trips per break-even vessel	0.0	0.0	0.0	-9.7	-9.6	-9.6	-100.0	-100.0	-100.0
Tuna revenue ($Millions)	0.0	0.0	0.0	-19.5	-5.2	-24.7	-100.0	-100.0	-100.0
Swordfish revenue ($Millions)	0.0	0.0	0.0	-0.5	-11.3	-11.8	-100.0	-100.0	-100.0
Shark revenue ($Millions)	0.0	0.0	0.0	-0.4	-1.2	-1.6	-100.0	-100.0	-100.0
Other PMUS revenue ($milions)	0.0	0.0	0.0	-1.7	-1.0	-2.6	-100.0	-100.0	-100.0
Total revenue ($Millions)	0.0	0.0	0.0	-22.1	-18.6	-40.7	-100.0	-100.0	-100.0
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	0	0	0	0	0	0	0.0	0.0	0.0
Average revenue per break-even vessel ($)	0	0	0	-298,000	-414,000	-342,000	-100.0	-100.0	-100.0
Direct payments to labor ($Mllions)	0.0	0.0	0.0	-10.7	-9.0	-19.7	-100.0	-100.0	-100.0
Direct purchases from local input suppliers ($Millions)	0.0	0.0	0.0	-7.7	-6.5	-14.3	-100.0	-100.0	-100.0
Hawaii total economic impact--direct, indirect, and induced ($Millions)	0.0	0.0	0.0	-26.2	-22.1	-48.3	-100.0	-100.0	-100.0
Total turtle mortality (number)	0	0	0	-47	-103	-150	-400.0	-400.0	-400.0
Total albatross mortality (number)	0	0	0	-159	-2,077	-2,235	-200.0	-200.0	-200.0

Table 11 (continued): Projected Outcomes under Alternative 8

	Alternative 8			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	0.0	0.0	0.0	-211.8	-5,972.4	-6,184.2	-100.0	-100.0	-100.0
Bigeye (thousands of pounds)	0.0	0.0	0.0	-4,077.5	-1,078.7	-5,156.2	-100.0	-100.0	-100.0
Albacore (thousands of pounds)	0.0	0.0	0.0	-2,139.1	-353.3	-2,492.4	-100.0	-100.0	-100.0
Yellowfin (thousands of pounds)	0.0	0.0	0.0	-1,005.6	-707.0	-1,712.6	-100.0	-100.0	-100.0
Blue Shark (thousands of pounds)	0.0	0.0	0.0	-565.8	-4,903.0	-5,468.8	-100.0	-100.0	-100.0
Mako shark (thousands of pounds)	0.0	0.0	0.0	-87.7	-76.2	-163.8	-100.0	-100.0	-100.0
Thresher shark (thousands of pounds)	0.0	0.0	0.0	-272.4	-31.1	-303.6	-100.0	-100.0	-100.0
Blue Marlin (thousands of pounds)	0.0	0.0	0.0	-550.2	-456.0	-1,006.2	-100.0	-100.0	-100.0
Striped Marlin (thousands of pounds)	0.0	0.0	0.0	-676.8	-252.0	-928.9	-100.0	-100.0	-100.0
Total PMUS (thousands of pounds)	0.0	0.0	0.0	-9,586.9	-13,829.7	-23,416.7	-100.0	-100.0	-100.0
Loggerhead Take (number)	0	0	0	-23	-394	-418	-100.0	-100.0	-100.0
Leatherback Take (number)	0	0	0	-39	-73	-112	-100.0	-100.0	-100.0
Ridley Take (number)	0	0	0	-109	-37	-146	-100.0	-100.0	-100.0
Green Take (number)	0	0	0	-19	-21	-40	-100.0	-100.0	-100.0
Take of All Turtle Species (number)	0	0	0	-190	-526	-716	-100.0	-100.0	-100.0
Loggerhead Kill (number)	0	0	0	-5	-82	-87	-100.0	-100.0	-100.0
Leatherback Kill (number)	0	0	0	-3	-6	-9	-100.0	-100.0	-100.0
Ridley Kill (number)	0	0	0	-36	-12	-49	-100.0	-100.0	-100.0
Green Kill (number)	0	0	0	-2	-3	-5	-100.0	-100.0	-100.0
Kill of All Turtle Species (number)	0	0	0	-47	-103	-150	-100.0	-100.0	-100.0
Black footed Albatross Take (number)	0	0	0	-128	-1,299	-1,427	-100.0	-100.0	-100.0
Laysan Albatross Take (number)	0	0	0	-54	-1,111	-1,165	-100.0	-100.0	-100.0
Total Take of Albatross (number)	0	0	0	-182	-2,410	-2,592	-100.0	-100.0	-100.0
Black footed Albatross Kill (number)	0	0	0	-115	-1,168	-1,283	-100.0	-100.0	-100.0
Laysan Albatross Kill (number)	0	0	0	-44	-908	-952	-100.0	-100.0	-100.0
Total Kill of Albatross (number)	0	0	0	-159	-2,077	-2,235	-100.0	-100.0	-100.0

Table 12. Projected Outcomes under Alternative 10 with Switching

	Alternative 10 with Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	108	0	108	34	-45	-11	45.9	-100.0	-9.2
Persons on break-even vessels	594	0	594	187	-203	-16	45.9	-100.0	-2.6
Effort (sets)	11,879	0	11,879	4,751	-4,751	0	66.7	-100.0	0.0
Effort (trips)	1,190	0	1,190	476	-433	43	66.7	-100.0	3.7
Trips per break-even vessel	11.0	0.0	11.0	1.4	-9.6	1.4	14.2	-100.0	14.3
Tuna revenue ($Millions)	31.5	0.0	31.5	12.0	-5.2	6.9	61.6	-100.0	27.9
Swordfish revenue ($Millions)	1.3	0.0	1.3	0.8	-11.3	-10.5	173.3	-100.0	-89.2
Shark revenue ($Millions)	0.4	0.0	0.4	-0.0	-1.2	-1.2	-9.5	-100.0	-77.5
Other PMUS revenue ($milions)	3.2	0.0	3.2	1.6	-1.0	0.6	93.4	-100.0	22.5
Total revenue ($Millions)	36.4	0.0	36.4	14.4	-18.6	-4.3	65.1	-100.0	-10.5
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	165,192	0	165,192	165,192	0	165,192	0.0	0.0	0.0
Average revenue per break-even vessel ($)	336,000	0	336,000	38,000	-414,000	-6,000	12.8	-100.0	-1.8
Direct payments to labor ($Mllions)	17.6	0.0	17.6	7.0	-9.0	-2.1	65.1	-100.0	-10.5
Direct purchases from local input suppliers ($Millions)	12.8	0.0	12.8	5.0	-6.5	-1.5	65.1	-100.0	-10.5
Hawaii total economic impact--direct, indirect, and induced ($Millions)	43.2	0.0	43.2	17.1	-22.1	-5.1	65.1	-100.0	-10.5
Total turtle mortality (number)	26	0	26	-21	-103	-124	-45.0	-100.0	-82.8
Total albatross mortality (number)	26	0	26	-133	-2,077	-2,209	-83.5	-100.0	-98.8

Table 12 (continued): Projected Outcomes under Alternative 10 with Switching

	Alternative 10 with Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	546.1	0.0	546.1	334.3	-5,972.4	-5,638.1	157.8	-100.0	-91.2
Bigeye (thousands of pounds)	5,888.2	0.0	5,888.2	1,810.7	-1,078.7	732.0	44.4	-100.0	14.2
Albacore (thousands of pounds)	4,004.5	0.0	4,004.5	1,865.4	-353.3	1,512.1	87.2	-100.0	60.7
Yellowfin (thousands of pounds)	1,533.6	0.0	1,533.6	527.9	-707.0	-179.1	52.5	-100.0	-10.5
Blue Shark (thousands of pounds)	175.6	0.0	175.6	-390.2	-4,903.0	-5,293.2	-69.0	-100.0	-96.8
Mako shark (thousands of pounds)	171.6	0.0	171.6	84.0	-76.2	7.8	95.8	-100.0	4.8
Thresher shark (thousands of pounds)	309.3	0.0	309.3	36.8	-31.1	5.7	13.5	-100.0	1.9
Blue Marlin (thousands of pounds)	1,072.5	0.0	1,072.5	522.3	-456.0	66.3	94.9	-100.0	6.6
Striped Marlin (thousands of pounds)	1,157.3	0.0	1,157.3	480.4	-252.0	228.4	71.0	-100.0	24.6
Total PMUS (thousands of pounds)	14,858.7	0.0	14,858.7	5,271.7	-13,829.7	-8,558.0	55.0	-100.0	-36.5
Loggerhead Take (number)	0	0	0	-23	-394	-418	-100.0	-100.0	-100.0
Leatherback Take (number)	20	0	20	-18	-73	-92	-47.2	-100.0	-81.8
Ridley Take (number)	70	0	70	-39	-37	-76	-35.9	-100.0	-52.2
Green Take (number)	6	0	6	-13	-21	-34	-68.1	-100.0	-85.0
Take of All Turtle Species (number)	96	0	96	-93	-526	-620	-49.2	-100.0	-86.5
Loggerhead Kill (number)	0	0	0	-5	-82	-87	-100.0	-100.0	-100.0
Leatherback Kill (number)	2	0	2	-2	-6	-8	-47.2	-100.0	-81.8
Ridley Kill (number)	23	0	23	-13	-12	-25	-35.9	-100.0	-52.2
Green Kill (number)	1	0	1	-2	-3	-4	-68.1	-100.0	-85.0
Kill of All Turtle Species (number)	26	0	26	-21	-103	-124	-45.0	-100.0	-82.8
Black footed Albatross Take (number)	21	0	21	-107	-1,299	-1,406	-83.7	-100.0	-98.5
Laysan Albatross Take (number)	9	0	9	-45	-1,111	-1,156	-82.8	-100.0	-99.2
Total Take of Albatross (number)	30	0	30	-152	-2,410	-2,562	-83.5	-100.0	-98.8
Black footed Albatross Kill (number)	19	0	19	-96	-1,168	-1,265	-83.7	-100.0	-98.5
Laysan Albatross Kill (number)	8	0	8	-37	-908	-945	-82.8	-100.0	-99.2
Total Kill of Albatross (number)	26	0	26	-133	-2,077	2,209	83.5	100.0	98.8

	Alternative 10 without Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	77	0	77	3	-45	-42	4.1	-100.0	-35.3
Persons on break-even vessels	424	0	424	17	-203	-186	4.2	-100.0	-30.5
Effort (sets)	7,640	0	7,640	512	-4,751	-4,239	7.2	-100.0	-35.7
Effort (trips)	766	0	766	51	-433	-382	7.2	-100.0	-33.3
Trips per break-even vessel	9.9	0.0	9.9	0.3	-9.6	0.3	3.0	-100.0	3.1
Tuna revenue ($Millions)	20.5	0.0	20.5	1.0	-5.2	-4.1	5.2	-100.0	-16.8
Swordfish revenue ($Millions)	0.7	0.0	0.7	0.3	-11.3	-11.1	57.0	-100.0	-93.8
Shark revenue ($Millions)	0.2	0.0	0.2	-0.2	-1.2	-1.4	-41.7	-100.0	-85.5
Other PMUS revenue ($milions)	2.0	0.0	2.0	0.4	-1.0	-0.6	22.0	-100.0	-22.7
Total revenue ($Millions)	23.5	0.0	23.5	1.5	-18.6	-17.1	6.7	-100.0	-42.1
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	52,604	0	52,604	52,604	0	52,604	0.0	0.0	0.0
Average revenue per break-even vessel ($)	305,000	0	305,000	7,000	-414,000	-37,000	2.3	-100.0	-10.8
Direct payments to labor ($Mllions)	11.4	0.0	11.4	0.7	-9.0	-8.3	6.7	-100.0	-42.1
Direct purchases from local input suppliers ($Millions)	8.3	0.0	8.3	0.5	-6.5	-6.0	6.7	-100.0	-42.1
Hawaii total economic impact--direct, indirect, and induced ($Millions)	28.0	0.0	28.0	1.8	-22.1	-20.4	6.7	-100.0	-42.1
Total turtle mortality (number)	17	0	17	-30	-103	-133	-64.0	-100.0	-88.8
Total albatross mortality (number)	15	0	15	-144	-2,077	-2,221	-90.6	-100.0	-99.3

Table 13 (continued): Projected Outcomes under Alternative 10 without Switching

	Alternative 10 without Switching			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	322.8	0.0	322.8	111.0	-5,972.4	-5,861.4	52.4	-100.0	-94.8
Bigeye (thousands of pounds)	4,081.1	0.0	4,081.1	3.6	-1,078.7	-1,075.1	0.1	-100.0	-20.9
Albacore (thousands of pounds)	2,360.5	0.0	2,360.5	221.4	-353.3	-131.9	10.4	-100.0	-5.3
Yellowfin (thousands of pounds)	1,036.6	0.0	1,036.6	30.9	-707.0	-676.1	3.1	-100.0	-39.5
Blue Shark (thousands of pounds)	112.4	0.0	112.4	-453.4	-4,903.0	-5,356.3	-80.1	-100.0	-97.9
Mako shark (thousands of pounds)	103.3	0.0	103.3	15.6	-76.2	-60.6	17.8	-100.0	-37.0
Thresher shark (thousands of pounds)	216.1	0.0	216.1	-56.3	-31.1	-87.4	-20.7	-100.0	-28.8
Blue Marlin (thousands of pounds)	700.1	0.0	700.1	149.9	-456.0	-306.1	27.2	-100.0	-30.4
Striped Marlin (thousands of pounds)	747.6	0.0	747.6	70.8	-252.0	-181.2	10.5	-100.0	-19.5
Total PMUS (thousands of pounds)	9,680.4	0.0	9,680.4	93.5	-13,829.7	-13,736.3	1.0	-100.0	-58.7
Loggerhead Take (number)	0	0	0	-23	-394	-418	-100.0	-100.0	-100.0
Leatherback Take (number)	16	0	16	-22	-73	-96	-57.9	-100.0	-85.5
Ridley Take (number)	45	0	45	-64	-37	-101	-58.6	-100.0	-69.1
Green Take (number)	4	0	4	-15	-21	-36	-81.1	-100.0	-91.1
Take of All Turtle Species (number)	65	0	65	-125	-526	-651	-65.7	-100.0	-90.9
Loggerhead Kill (number)	0	0	0	-5	-82	-87	-100.0	-100.0	-100.0
Leatherback Kill (number)	1	0	1	-2	-6	-8	-57.9	-100.0	-85.5
Ridley Kill (number)	15	0	15	-21	-12	-34	-58.6	-100.0	-69.1
Green Kill (number)	0	0	0	-2	-3	-5	-81.1	-100.0	-91.1
Kill of All Turtle Species (number)	17	0	17	-30	-103	-133	-64.0	-100.0	-88.8
Black footed Albatross Take (number)	12	0	12	-116	-1,299	-1,415	-90.7	-100.0	-99.2
Laysan Albatross Take (number)	5	0	5	-49	-1,111	-1,160	-90.2	-100.0	-99.5
Total Take of Albatross (number)	17	0	17	-164	-2,410	-2,575	-90.6	-100.0	-99.3
Black footed Albatross Kill (number)	11	0	11	-104	-1,168	-1,273	-90.7	-100.0	-99.2
Laysan Albatross Kill (number)	4	0	4	-40	-908	-948	-90.2	-100.0	-99.5

Table 14. Projected Outcomes Under Option A -- The Research Fishery

	Research Fishery			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Break-even vessels (number)	0	31	31	0	-14	-14	0.0	-31.1	-31.1
Persons on break-even vessels	0	140	140	0	-63	-63	0.0	-31.0	-31.0
Effort (sets)	0	3,500	3,500	0	-1,251	-1,251	0.0	-26.3	-26.3
Effort (trips)	0	319	319	0	-114	-114	0.0	-26.3	-26.3
Trips per break-even vessel	0.0	10.3	10.3	0.0	0.7	0.7	0.0	6.9	6.9
Tuna revenue ($Millions)	0.0	4.0	4.0	0.0	-1.1	-1.1	0.0	-21.5	-21.5
Swordfish revenue ($Millions)	0.0	8.2	8.2	0.0	-3.1	-3.1	0.0	-27.4	-27.4
Shark revenue ($Millions)	0.0	0.0	0.0	0.0	-1.2	-1.2	0.0	-97.2	-97.2
Other PMUS revenue ($milions)	0.0	0.7	0.7	0.0	-0.3	-0.3	0.0	-31.3	-31.3
Total revenue ($Millions)	0.0	13.0	13.0	0.0	-5.7	-5.7	0.0	-30.5	-30.5
Fleet-wide direct seabird & turtle compliance cost ($ annualized over 5 years)	0	0	0	0	0	0	0.0	0.0	0.0
Average revenue per break-even vessel ($)	0	418,000	418,000	0	4,000	4,000	0.0	1.0	1.0
Direct payments to labor ($Mllions)	0.0	6.3	6.3	0.0	-2.7	-2.7	0.0	-30.5	-30.5
Direct purchases from local input suppliers ($Millions)	0.0	4.6	4.6	0.0	-2.0	-2.0	0.0	-30.5	-30.5
Hawaii total economic impact--direct, indirect, and induced ($Millions)	0.0	15.4	15.4	0.0	-6.7	-6.7	0.0	-30.5	-30.5
Total turtle mortality (number)	0	106	106	0	2	2	0.0	2.4	1.7
Total albatross mortality (number)	0	155	155	0	-1,922	-1,922	0.0	-92.5	-86.0

Table 14 (continued): Projected Outcomes under Option A -- the Research Fishery

	Research Fishery			Change from Alternative 1			Percentage change from Alternative 1		
	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total	Tuna Vessels	Swordfish Vessels	Total
Swordfish (thousands of pounds)	0.0	4,928.5	4,928.5	0.0	-1,043.9	-1,043.9	0.0	-17.5	-17.5
Bigeye (thousands of pounds)	0.0	777.1	777.1	0.0	-301.6	-301.6	0.0	-28.0	-28.0
Albacore (thousands of pounds)	0.0	220.4	220.4	0.0	-132.9	-132.9	0.0	-37.6	-37.6
Yellowfin (thousands of pounds)	0.0	385.7	385.7	0.0	-321.3	-321.3	0.0	-45.5	-45.5
Blue Shark (thousands of pounds)	0.0	555.9	555.9	0.0	-4,347.1	-4,347.1	0.0	-88.7	-88.7
Mako shark (thousands of pounds)	0.0	45.3	45.3	0.0	-30.9	-30.9	0.0	-40.5	-40.5
Thresher shark (thousands of pounds)	0.0	19.9	19.9	0.0	-11.2	-11.2	0.0	-35.9	-35.9
Blue Marlin (thousands of pounds)	0.0	228.2	228.2	0.0	-227.8	-227.8	0.0	-50.0	-50.0
Striped Marlin (thousands of pounds)	0.0	193.4	193.4	0.0	-58.6	-58.6	0.0	-23.2	-23.2
Total PMUS (thousands of pounds)	0.0	7,354.4	7,354.4	0.0	-6,475.3	-6,475.3	0.0	-46.8	-27.7
Loggerhead Take (number)	0	345	345	0	-50	-50	0.0	-12.6	-12.6
Leatherback Take (number)	0	67	67	0	-7	-7	0.0	-9.2	-9.2
Ridley Take (number)	0	77	77	0	40	40	0.0	107.0	107.0
Green Take (number)	0	23	23	0	1	1	0.0	6.8	6.8
Take of All Turtle Species (number)	0	511	511	0	-15	-15	0.0	-2.9	-2.1
Loggerhead Kill (number)	0	72	72	0	-10	-10	0.0	-12.6	-12.6
Leatherback Kill (number)	0	6	6	0	-1	-1	0.0	-9.2	-9.2
Ridley Kill (number)	0	26	26	0	13	13	0.0	107.0	107.0
Green Kill (number)	0	3	3	0	0	0	0.0	6.8	6.8
Kill of All Turtle Species (number)	0	106	106	0	2	2	0.0	2.4	1.7
Black footed Albatross Take (number)	0	98	98	0	-1,201	-1,201	0.0	-92.4	-92.4
Laysan Albatross Take (number)	0	82	82	0	-1,030	-1,030	0.0	-92.6	-92.6
Total Take of Albatross (number)	0	180	180	0	-2,231	-2,231	0.0	-92.5	-86.1
Black footed Albatross Kill (number)	0	88	88	0	-1,080	-1,080	0.0	-92.4	-92.4
Laysan Albatross Kill (number)	0	67	67	0	-841	-841	0.0	-92.6	-92.6

APPENDIX N

Excerpt from the Biological Opinion for the California/Oregon Drift Gillnet Fishery, National Marine Fisheries Service, October 23, 2000.

Excerpt from the Biological Opinion for the California/Oregon Drift Gillnet Fishery, issued by the National Marine Fishery Service on October 23, 2000.

North Pacific Driftnet Fisheries (pre-12/92)

reign high-seas driftnet fishing in the north Pacific Ocean for squid, tuna and billfish ended with a ited Nations moratorium in December, 1992. Except for observer data collected in 1990-1991, there virtually no information on the incidental take of sea turtle species by the driftnet fisheries prior to the oratorium. The cessation of high-seas driftnet fishing should have reduced the incidental take of listed ecies. However, nations involved in driftnet fishing may have shifted to longline fishing worldwide, or coastal gillnet operations within their respective EEZs, which may increase (e.g. more coastal driftnets ay impact post-pelagic stage loggerheads), maintain, or decrease (i.e. longlines, in general) the take of a turtles. Tables 1 and 2 in Appendix A provide a summary of the number of active Japanese, Korean, d Taiwanese vessels fishing mainly for tuna in the Central Western Pacific Ocean from 1990-99.

e high seas squid driftnet fishery in the North Pacific was observed in Japan, Korea, and Taiwan, while e large-mesh fisheries targeting tuna and billfish were observed in the Japanese fleet (1990-91) and the iwanese fleet (1990). A combination of observer data and fleet effort statistics indicate that 4,373 rtles, mostly loggerheads and leatherbacks, were entangled by the combined fleets of Japan, Korea and iwan during June, 1990 through May, 1991, when all fleets were monitored (Table 4). Of these idental entanglements, an estimated 1,011 turtles were killed (77 percent survival rate).

Table 4. Estimated annual bycatch and mortality of sea turtles in the North Pacific high-seas driftnet fishery for squid, tuna and billfish in 1990-91 (Wetherall, 1997).

Species	Estimated Annual Take	Estimated Annual Mortality
green	378	93
leatherback	1,002	111
loggerhead	2,986	805
(hawksbill)	7	2
TOTAL	4,373	1,011

ta on size composition of the turtles caught in the high-seas driftnet fisheries were also collected by servers. Green turtles and the majority of loggerheads measured by observers were immature, and ost of the actual measured leatherbacks were immature, although the size of leatherbacks that were o large to bring on board were only estimated, and are therefore unreliable (Wetherall, 1997).

ese rough mortality estimates for a single fishing season provide only a narrow glimpse of the impacts the driftnet fishery on sea turtles, and a full assessment of impacts would consider the turtle mortality nerated by the driftnet fleets over their entire range. Unfortunately, comprehensive data are lacking, t the observer data does indicate the possible magnitude of turtle mortality given the best information available. Wetherall et *al*. (1993) speculate that the actual mortality of sea turtles may have been between 2,500 and 9,000 per year, with most of the mortalities being loggerheads taken in the Japane and Taiwanese large-mesh fisheries.

While a comprehensive, quantitative assessment of the impacts of the North Pacific driftnet fishery or turtles is impossible without a better understanding of turtle population abundance, stock origins, exploitation history and population dynamics, it is likely that the mortality inflicted by the driftnet fisheries in 1990 and in prior years was significant (Wetherall et *al*., 1993), and the effects may still be evident in sea turtle populations today. The high mortality of juvenile, pre-reproductive adults, and reproductive adults in the high-seas driftnet fishery has probably altered the current age structure (especially if certain age groups were more vulnerable to driftnet fisheries) and therefore diminished c limited the reproductive potential of affected sea turtle populations.

(ii). Japanese tuna longliners in the Western Pacific Ocean and South China Sea

Nishimura and Nakahigashi (1990) estimated that 21,200 turtles, including greens, leatherbacks, loggerheads, olive ridleys and hawksbills, were captured annually by Japanese tuna longliners in the western Pacific and South China Sea, with a reported mortality of approximately 12,300 turtles per ye These estimates were based on turtle sightings and capture rates reported in a survey of fisheries research and training vessels and extrapolated to total longline fleet effort. Using commercial logbook research-vessel data and questionnaires from longliners from 1988, Nishimura estimated that for ever 10,000 hooks in the north Pacific and South China Sea, one turtle is captured, with a mortality rate of percent. Although species-specific information is not available, vessels reported sightings of turtles in locations which overlap with commercial fishing grounds in the following proportions: loggerhead - 36 percent, green turtle - 19 percent, hawksbill - 10.3 percent, olive ridley - 1.7 percent, leatherback - 13 percent, and unknown - 19 percent. Because the data collected by Nishimura and Nakahigashi were based on observations by training and research vessels, logbooks and a questionnaire, and assumed th turtles were distributed homogeneously, such estimates may be biased. NMFS is unaware of any follo up studies since 1990 (J.Wetherall, NMFS, pers. comm., 1999).

As shown in Appendix A, Table 1, the number of active coastal and distant water Japanese tuna longlin has remained relatively constant from 1990-99 (averaging 740 and 660 vessels, respectively, per year), while the number of active offshore tuna longliners in 1997-99 have declined by nearly one half (from approximately 360 vessels to 180 vessels) since 1990[1]. Two other countries comprising a large amoun longline effort in the central western Pacific include Korea and Taiwan. Taiwan's offshore fleet is particularly large, composed of an average of 1,500 active vessels per year (based on data from 1990-99), while the number of vessels included in its distant water fleet ranged from 52 to 88 vessels over t past ten years. The number of vessels included in Korea's longline fleet has remained relatively constan from 1990-99, averaging 168 active vessels per year (Appendix A, Table 1). Although the data and analysis provided by Nishimura and Nakahigashi (1990) are conjectural, longliners fishing in the Pacific have had, and (with the current level of effort) probably continue to have significant impacts on sea tur populations. Unfortunately, current bycatch information is not available for these fisheries. Future investigations into the level of sea turtle bycatch in these fisheries would allow a more complete

---

[1] In reference to the Japanese tuna longline fleet, "offshore" refers to vessels that fish outside Japan's EEZ but closer Japan, while "distant water" refers to vessels which fish in other areas throughout the Pacific Ocean (A. Coan, NMFS, pers. com August, 2000).

sessment of cumulative effects on pelagic sea turtles in the Pacific Ocean.

i). South American fisheries

ile

though data on the incidental take of sea turtles in the Chilean swordfish fisheries are sparse, both een and leatherback turtles have been confirmed taken and killed, and olive ridleys and loggerheads ay also be taken incidentally by the fishery (Weidner and Serrano, 1997). As described further in ppendix A, the Chilean swordfish fishery is comprised primarily of artisanal fishermen, averaging 500 bats (mainly driftnetters) from 1989 to 1991, and decreasing in numbers after 1991. Since 1991, pproximately 20 large industrial (i.e., commercial) boats have fished swordfish in Chile, the effort is mprised of gillnets (27 percent), pelagic longliners (72 percent) and boats that switch gear. Effort by e artisanal fishery (including the driftnet fleet) increased from 5,265 days-at-sea in 1987 to 41,315 ys-at-sea in 1994 (Barbieri *et al.*, 1998).

dult female leatherbacks tagged in Mexico have been taken in Chilean waters by gillnet *and* purse seine heries (Marquez and Villanueva, 1993). In addition, data were recorded opportunistically from the tisanal swordfish fishery (driftnetters primarily) for a single port (San Antonio) over a two year period. his partial record documented leatherback captures and sightings totaling 9 in 1988 and 21 in 1989. A ugh estimate of 250 leatherback takes per year without differentiating between kills and total takes for ssels operating out of San Antonio was provided (Frazier and Brito Montero, 1990). A more recent timated annual take of 500 leatherbacks was provided by Montero (pers. comm., 1997, *in* Eckert, 97) which was not unreasonable, given the nearly ten-fold increase in fishing effort from 1987 to 94[2]. As shown in Table 5, the take of sea turtles by the artisanal driftnet fishery in the late 1980s peared to be comprised primarily of leatherbacks.

Table 5: Chile – turtle bycatch of artisanal driftnet fishermen, 1988-89

Species	Number	Percentage of Total
Green turtle	42	28%
Leatherback	82	55%
Loggerhead	5	3%
Olive ridley	21	14%
Total	150	100%

Source: José Brito-Montero, personal communication, 3/3/97, *in* Weidner and Serrano, 1997

fort by the artisanal driftnet fishery for swordfish appears to be relatively constant through 1996, as shown in Table 6. Given the total sea turtle take estimate from the 1988-89 season, and combining i with the total effort (days-at-sea) data from 1988-1996, and assuming effort was constant and in the same general area during all years, a simple calculation can be made to estimate the incidental take of turtles by the Chilean artisanal driftnet fishery for swordfish during subsequent years (third column in Table 6). Turtles reportedly began appearing in Chilean markets in 1987, just as the swordfish driftne fishery was expanding, and Chilean observers have reported occasional individual sets with leatherbac mortalities of from 3-13 (*in* Weidner and Serrano, 1997). Assuming the current artisanal driftnet fishin effort is equivalent to 1996, this fishery would currently take an estimated 39 greens, 76 leatherbacks, loggerheads, and 29 olive ridleys annually, assuming the proportion of species taken is equivalent to d collected from the 1988-89 fishing season.

---

[2] Based on all information from Chile and Peru, Eckert (1997) estimated that a minimum of 2,000 leatherbacks are killed nually by Peruvian and Chilean swordfish operations, representing a major source of mortality for leatherbacks originating from d returning to nesting beaches in Costa Rica and Mexico. Because swordfish fishing effort has declined significantly since the rly 1990s, incidental take has most likely declined as well, although the current estimate is unknown.

Table 6. Chile - artisanal (driftnet) swordfish effort, by year, from 1989-1996

Year	Effort (Days-at-sea)	Calculated Turtle Take*
1989	7,579	150*
1990	6,226	123
1991	11,450	227
1992	11,209	222
1993	10,755	213
1994	8,393	166
1995	8,152	161
1996	7,041	139

*Calculated turtle take was estimated by comparing effort for 1989 (7,579 days-at-sea) and a known turtle take of 150 (1988-89 season) with subsequent years for which effort was known, but turtle take is not known.

**Estimated take of turtles by Brito-Montero, for the 1988-89 season, and assuming 1989 data is equivalent in effort to 1988-89 effort, for the purpose of comparing year-to-year calculations of estimated turtle take. Source: Weidner and Serrano, 1997.

During 1996, there was a substantial expansion of Chilean longline fishing in offshore areas, but there been no collection or collaboration of data on this fishery as of 1997 (Weidner and Serrano, 1997), the anticipated effects on sea turtle stocks as a result in this change in fishing strategy are not known. Sinc effort for swordfish in the Chilean fishery or throughout the Pacific has declined significantly overall si 1994 (as a result of concerns about overfishing swordfish stocks) the bycatch of sea turtles in this fishe has likely declined as well, although the extent of this decrease is currently unknown. There is very litt information on lethal and non-lethal incidental catch per unit effort. In addition to the swordfish fisher Chile also has a substantial purse seine fleet, which has recently shifted from a reliance on coastal anchovy and sardines to a massive take of jack mackerel further offshore, where turtle interactions m be more common (Weidner and Serrano, 1997). The extent of the impact of the Chilean purse seine fishery on sea turtles is unknown.

olumbia

description of known Columbian commercial fisheries is provided in Appendix A and summarized in able 5 of the Appendix. No information is available on the sea turtle bycatch levels in the shrimp trawl sheries and other fisheries operating out of Columbia. However, a turtle excluder device program has een initiated in the shrimp trawl fishery to reduce incidental catch. Artisanal fisheries in the past argeted turtles (Weidner and Serrano, 1997); however, no recent information on directed take is vailable.

cuador

ppendix A contains a description of known current commercial and artisanal fisheries in Ecuador. nfortunately, the composition of turtle species incidentally taken by Ecuadoran commercial and rtisanal fisheries is unavailable. Prior to a ban on the commercial harvest for olive ridleys in 1986, rtisanal fishermen prosecuted a directed turtle fishery as well as taking them incidentally. During 1985 nd 1986, 124 and 715 metric tons of turtles, respectively, were reportedly taken (Table 7). In 1990, the cuadoran government permanently ended the directed fishery, prohibiting the catch as well as omestic and export marketing. Incidental catches of sea turtles by tuna and swordfish longliners are eportedly very rare, but they do occur, and Ecuadoran authorities have seized turtle skins from panese longliners (*in* Weidner and Serrano, 1997).

eru

ppendix A contains a description of known domestic and foreign fisheries in Peru. Peruvian commercial ngline fleets have had limited success in fishing for swordfish, so there is probably very little incidental atch of sea turtles in this fishery. Peruvian artisanal fishermen, however, also target fish species normally ken in commercial longline fisheries (especially shark) and have been more successful than the ommercial longline fleet, so more turtles may be caught incidental to these artisanal fisheries. Foreign ngline fleets are also active and extensive off Peru and the bycatch of sea turtles in these foreign sheries has been considered significant (Weidner and Serrano, 1997).

eru conducted directed commercial turtle harvests throughout the 1980s, and, as recently as 1990, ver 100 metric tons of turtles were taken (Table 7) (FAO, Yearbook of Fishery Statistics, 1994, *in* eidner and Serrano (1997)). Species-specific information was not available. Based on a sighting of 167 atherback carapaces in a canyon near the port of Pucusana in 1978, Brown and Brown (1982) timated a minimum of 200 leatherbacks killed per year at that time. Furthermore, central Peru was nown to have had the largest leatherback fishery in the world, taking what appeared to be adults and ibadults, thus representing a considerable number of reproductive and near reproductive individuals (*in* own and Brown, 1982). The Ministerio de Pesqueria (MIPE), which is the Peruvian agency responsible r fisheries, prohibited the taking of all leatherbacks and green turtles less or equal to 80cm in length rough a resolution in January, 1977, although observers report that regulations are rarely enforced. ther species were not protected and were still unprotected as of 1989, although catches appear to ve declined to negligible levels (Weidner and Serrano, 1997), although specific take levels remain known.

Table 7. Ecuador and Peru - turtle catch in metric tons, 1985-95

Year	Catch - Ecuador (metric tons)	Catch - Peru (metric tons)

1985	124	36
1986	715	9
1987	–	305
1988	–	32
1989	–	79
1990	–	101
1991	–	9
1992	–	30
1993	–	28
1994	–	6
1995	10*	4*

Source: FAO, Yearbook of Fishery Statistics, 1994, *in* Weidner and Serrano (1997)

*1995 data would not be found in the above source, yet Weidner and Serrano (1997) provide data for this year.

(iv). Fisheries in the Federated States of Micronesia

Incidental capture of sea turtles was reported by observers aboard tuna purse seine and longline vesse licensed to fish in the EEZ of the Federated States of Micronesia for the years 1980-1993. Seven of the thirteen turtles reported taken by longliners were unidentified and released alive and unharmed. The remainder included 1 hawksbill, 2 leatherbacks, and 3 olive ridleys. Only one turtle, an olive ridley, was reported as killed; the rest were released alive and unharmed. A total of 38 out of a possible 54 observ trips were reviewed, and out of 280,110 hooks monitored, seven turtles were observed caught, giving rough estimate of 0.025 turtles caught for every 1,000 hooks (or for every 40,000 hooks set, one sea turtle is incidentally caught). For purse seiners fishing in Micronesia, 7 sea turtles were reported incidentally captured - 2 hawksbills, 2 olive ridleys, and 3 recorded as unidentified. Of these, one olive ridley, one hawksbill and two unidentified turtles were released alive and unharmed, one hawksbill was reported as dead/discarded, one olive ridley was injured in the power block, and the condition of one unidentified turtle was unknown (Thoulag, 1993).

The number of active longline vessels in Micronesia has tripled, from 7 in 1993 to 21 in 1998 and 1999. contrast, the number of Micronesian purse seine vessels has been reduced from 6-7 in the early 1990s 3 in 1998 and 1999 (Appendix A, Table 1). Because such a small number of trips have been monitored these fisheries, the estimated take of turtles, based on observer data, is small compared to the current longline and purse seine effort in Micronesia's EEZ. However, without knowing the percentage observ coverage, annual take estimates by these fisheries will only take into account the reported take of turtl from 1980-93; therefore, these are *minimum* estimates. Apportioning the unidentified turtles to observ known species taken, and using only the observed take of sea turtles, the estimated annual take of species included in this Opinion by longliners is: 0.3 leatherbacks taken (0 mortalities) and 0.5 olive ridleys taken (0.2 mortalities). The estimated annual take of sea turtles included in this Opinion by icronesian purse seiners, based on observer data collected from 1980-93, is: 0.3 olive ridleys (0.2 ortalities).

). Western Pacific U.S. tuna purse seine fishery

ommercial fishing for tropical tunas in the western Pacific Ocean by U.S. registered purse seiners has en managed according to requirements of the South Pacific Regional Tuna Treaty since June, 1988. e treaty was signed by the United States and 16 Pacific island countries, and provides U.S. tuna purse iners access to tunas in a 25.9 million km^2 area of the central-western Pacific Ocean in exchange for hing fees and adherence to rules related to closed area, etc. The agreement ends in 2003 (Coan, *et al.*, 97). In 1998, most of the U.S. fleet, which consisted of 39 vessels, fished between 165°W and 155°E ngitude and between 10°N and 10°S latitude (Coan, *et al.*, 1999). Because there is not the aracteristic tuna-dolphin association in the western Pacific as there is in the ETP, U.S. fishermen set on ating objects (logs and fish aggregating devices) and schools to catch tuna. The U.S. fleet is required to ke observers on a minimum of 20 percent of their fishing trips. In 1998, observers recorded one gerhead turtle taken, although it is unclear as to whether the turtle was released unharmed, injured or led (Coan, *et al.*, 1999). From June, 1997 to June, 1998, observers anecdotally (recorded in their gbooks) observed one green turtle taken and released unharmed, and one unidentified turtle taken and leased unharmed (Forum Fisheries Agency, 1998). Extrapolating this information based on percentage observer coverage, the entire U.S. western Pacific fleet may capture 5 loggerheads, 5 greens, and 5 identified sea turtles each year, assumed to be either loggerheads or greens, based on observer data.

i). U.S. tuna purse seine fishery in the eastern tropical Pacific Ocean (ETP)

e number of large (>400 short tons (st) carrying capacity) ETP tuna purse seine vessels has remained ady since 1992, varying between 5 and 7 vessels, and the number of smaller (≤400 st) vessels has also mained steady, averaging 18 vessels between 1993 and 1997 (NMFS, 1998b). Although all large tuna rse seine vessels fishing in the ETP for tuna have been required to carry observers since 1989 (100 rcent coverage), smaller purse seine vessels are not required to carry observers. Thus, no data are ailable on sea turtle interactions with the small tuna purse seine vessels in the ETP. Most smaller tuna ssels fishing off southern California fish on tuna schools because the vessels are old, slow, and lack the sources (e.g. helicopters) needed to place and find floating objects (B. Jacobson, NMFS, personal mmunication, 1999). Based on observer data from the large vessels, the chances of incidentally oturing a sea turtle during a school set are much less than incidentally capturing a sea turtle during ating object sets. NMFS believes that the capture of sea turtles in the small vessel fleet is rare. In dition to collecting tuna life history and marine mammal and bycatch data during a set, observers on ge U.S. purse seiners in the ETP complete a sea turtle life history form when a sea turtle is taken in a : (i.e., sea turtle was captured or at any time entangled in the net).

ble 9 shows sea turtle interactions in the large U.S. tuna purse seine fleet from 1990 to 1997. Data for 98 and most of 1999 has not been entered into a database and is therefore currently unavailable. The 90-1997 data include 174 turtles taken in the fishery that were not identified to species, although only f these unidentified turtles is listed as accidentally killed (as discussed earlier, these estimates may derestimate the number of sea turtles killed in the fishery because some turtles that were lethargic en they were released, which were considered "alive" when they were released, probably died from ir injuries subsequent to their release). Most of unidentified sea turtles probably never came on board, but escaped after being encircled or captured, and the observer was not close enough to identif the turtle as it swam away. Assuming that these unidentified turtle interactions occurred in the same proportions as the identified sea turtle interactions, these 174 turtles would most likely be comprised o 143 olive ridleys, 28 green turtles, and 1 to 3 leatherback, hawksbill or loggerhead turtles, in unknown proportion. It is likely that most of these 174 unidentified turtles were uninjured by their capture or encirclement if they did release themselves from the net and swim away.

Table 9. Sea turtle interactions by U.S. tuna purse seine fleet (1990 - 1997) - large vessels only [Note: there is some discrepancy between the numbers in the two parts of the table because previously dead turtles were not included in species estimates and hawksbill turtles were not included in the top part of the table and not accounted for it in the lower part]

Set Summary / by calendar year 1/1 - 12/30									
Cruise Year	**1990[1]**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**Total**
Number of sea turtles taken (mortality in parentheses) by species[2] Average									**Annual**
Olive ridley	113(2)	104	132	133(1)	69	69(1)	45(1)	95(1)	**96**
Green turtle	4	8	21	35	28	29	17	11	**19**
Leatherback	3	0	0	2	1	0	0	0	**0.8**
Loggerhead	0	1	0	0	3	0	0	2	**0.8**
Unidentified	36	37	25(1)	21	19	3	25	8	**22**
Totals	**156**	**150**	**178**	**191**	**120**	**101**	**87**	**116**	**137**
Condition of sea turtle when released (injury/mortality due to set) Average									**Annual**
Prev. dead	0	0	2	1	4	2	0	2	**1.4**
Released unharmed	126	137	168	181	115	92	73	110	**127**
Released slightly injured	13	5	7	1	3	6	5	2	**5.3**
Kill accidentally	2	0	1	1	0	1	1	1	**0.9**
Escaped net	11	5	3	6	2	0	7	3	**4.7**
Other/unknown	3	3	0	2	0	4	1	2	**1.9**
Totals	**156**	**150**	**181**	**192**	**124**	**105**	**87**	**120**	**141.1**

[1] First year of sea turtle data collection, did not began until 3/20. Summary reflects cruises from 3/20/90 - 12/30/90, when data was collected. 1,629 sets out of 1,814 for 1990 were observed for sea turtles.

[2] Mortalities are a subset of total incidental take.

In its December 8, 1999, biological opinion on the impacts of the interim final rule for the continued authorization of the ETP U.S. tuna purse seine fishery on listed species, NMFS estimated the maximum annual incidental takes and mortalities of sea turtles for 2000-2010: green - 35 taken, 2 killed; leatherbacks - 2 taken, 1 killed every 10 years; loggerheads - 3 taken, 1 killed every 7 years; olive ridleys -

taken, 7 killed (NMFS, 1999).

). Foreign tuna purse seine fishery in the ETP

international fleet represents the majority of the fishing effort and carrying capacity in the ETP tuna ery, with most of the total capacity consisting of purse seiners greater than 400 st. These large vessels nprised about 87 percent of the total fishing capacity operating in the ETP in 1996 (IATTC, 1998). An rage of 107 foreign vessels with a carrying capacity greater than 400 st fished in the ETP during 1993 997. In addition to these larger vessels, the foreign fleet contains smaller vessels less than 400 st that et tuna in the ETP. From 1993 to 1997, an average of 63 foreign vessels ranging from 45 to 400 st ying capacity fished in the ETP each year.

a from observers on both U.S. and foreign tuna purse seine vessels have been gathered collectively he IATTC since the early 1990s (Table 10; data are in addition to Table 9). The most recent data n the IATTC indicate that an average of 172 sea turtles per year were killed by vessels over 400 st in entire ETP purse seine fishery (U.S. included) from 1993-97 (IATTC, 1999).

le 10. Estimated sea turtle mortality by species for the entire ETP tuna purse seine fishery (U.S. and foreign) from 1993-1997[1]

Species/Year	1993	1994	1995	1996	1997
Olive ridley	197	103	94	83	99
Loggerhead	5	10	2	3	7
Green/black	39	8	12	7	19
Leatherback	0	0	0	1	0
Unidentified	46	36	32	29	25
TOTAL	287	157	140	123	150

[1] (M. Hall, IATTC, pers. comm., 1999)

1993-1997 data indicate that 168 turtles killed by the entire tuna purse seine fishery were identified," although the reasons for this were not given. Assuming that these unidentified turtle rtalities occurred in the same proportions as the identified turtle mortalities, these 168 turtles would 140 olive ridleys, 20 green turtles, 7 loggerhead turtles and one would be either a leatherback or vksbill.

. Mexican (Baja California) fisheries and direct harvest

ed on a combination of analyses of stranding data, tag-recapture studies and extensive interviews, all ried out between 1994 and 1999, Nichols (personal communication, October 2000) has conservative mates of the annual take of green turtles and loggerhead turtles by various fisheries and through ct harvest in the Baja California, Mexico region. Nichols and his affiliates estimated the annual rtality of green turtles in this region to be *greater* than 7,800 turtles, impacting both immature and lt turtles. Mortality of loggerhead turtles, based on stranding and harvest rates, is estimated at 1,950 ually, and affects primarily immature size classes. The primary causes for mortality are the incidental take in a variety of fishing gears and direct harvest for consumption and [illegal] trade.

APPENDIX O

Description of Methods for the Valuation of Environmental Goods.

uation of Environmental Goods

section of the DEIS provides an overview of issues involved with estimating the economic
e of species and environmental "goods" that may be affected by fisheries managed under the
tern Pacific Pelagics FMP. Topics of interest related to changes in the western Pacific
gics FMP include questions about how to measure economic impacts of the changes, how to
ond to the changes in the most cost-effective manner, and how the costs of changes
pare to the benefits expected with the changes. This discussion of species values provides
rmation that could be used in addressing the question of how the costs of changes to the
' might compare to the benefits. In particular, it explains the research that would be needed
stimate the benefits of the changes.

h of the information in this section is taken from the following primary sources:

6 WPRFMC. September 25, 2000. Preliminary Draft Environmental Impact Statement. Bottomfish and Seamount Groundfish Fishery in the Western Pacific Region.

2 Chapman, Duane. 1999. *Environmental Economics: Theory, Application, and Policy.* Addison Wesley Longman, Inc.

3 Arrow, Ken, et al. January 15, 1993. "Report of the NOAA Panel on Contingent Valuations," in *U.S. Federal Register*, Vol. 58, No. 10, 4602-4614.

5 Pearce, David and Dominic Moran. 1994. *The Economic Value of Biodiversity.* In association with the Biodiversity Programme of the International Union for the Conservation of Nature - The World Conservation Union. Earthscan Publishing, London.

5 Freeman, A.M. 1993. *The Measurement of Environmental and Resource Values: Theory and Methods.* Resources for the Future, Washington, DC.

6 Loomis, J.B. and D.S. White. 1996. "Economic Benefits of Rare and Endangered Species: Summary and Meta-Analysis," *Ecological Economics.* Vol. 18, 197-206.

7 Smith, V.K. 2000. "JEEM and Non-market Valuation: 1974-1998." *Journal of Environmental Economics and Management.* Vol. 39.

8 Morey, E.R., et al. 1985. *Valuing Marine Recreational Fishing on the Pacific Coast.* Prepared for National Marine Fisheries Service, La Jolla, California.

PF99 Kahneman, D. and J.L. Knetsch. 1992. "Valuing Public Goods: The Purchase of Moral Satisfaction." *Journal of Environmental Economics and Management*. Vol. 22, 57-70.

While the issue of species value is covered well in relevant literature, new research would be needed to determine the value of the sea turtles and seabirds affected by the western Pacific pelagic fishery. For example, numerous studies have been conducted on the value of endangere species (PF96). In addition, several studies provide estimates of the value of protected species in Hawai'i, including the Hawaiian monk seal (PF26). However, no valuation studies have been conducted for sea turtles or seabirds in Hawai'i, or for other species of interest in the pelagic fishery. As a result, new research would be needed to understand the value of these species. Such research has not been undertaken for this DEIS because reasonable estimates of the value of sea turtles and seabirds cannot be generated within the available budget or schedule.

This discussion provides an overview of the state of the art for valuation of environmental goods and explains the research that would be needed to estimate the value of sea turtles, seabirds, and other species of interest. The discussion reviews the theory and methodologies of non-market valuation[1] and provides an overview of issues specific to the pelagic fishery. In particular, the text describes the process by which values may be assigned to specific natural resources and the techniques that could be used to estimate those values. No attempt is made to refine or elaborate on the estimates of the cost of proposed changes to the FMP.

I Overview

Preserving environmental assets such as sea turtles and sea turtles may generate a range of potential benefits for humans. The Endangered Species Act (ESA) acknowledges this fact by noting that at-risk species "...are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people...." (Section 2[a][3]). In addition, environmental assets may have value separate from the value assigned to those assets by humans.

Values can be divided into a variety of categories, including use and non-use, direct use and passive use, and so on. Different publications use different taxonomies and suggest that economists are not in agreement on what values should and should not be considered (PF73).[2] Section 4 includes a table that identifies and explains the different types of value that can be considered. The types of value are similar to those in PF72.

---

[1] Non-market valuation is the economic assessment of the value of goods and services for which market data (for example, sales receipts or some other measure of what an individual is willing to pay for a particular item) are not available.

[2] For example, both PF26 and PF72 include a discussion about consumptive uses and nonconsumptive uses, but they include different presentations on other uses or sources of value. PF26 includes a discussion about secondary values that is not included in PF72, and PF72 includes a discussion about existence values that is not included in PF26. The differences are largely semantic, but can be important when trying to design a study to estimate the value of a particular species

icerns about how to describe values notwithstanding, the greatest challenge in valuing ources such as sea turtles and seabirds is determining a means of estimating those values in absence of observable data. The fact that people volunteer to watch sea turtles on beaches elp ensure that as many hatchlings as possible make it to the ocean provides evidence that ple assign value to sea turtles. Similarly, the fact that people travel great distances to see cific species of seabirds firsthand is evidence that people assign value to seabirds. ortunately, the magnitude of these values is difficult to gauge because not all such actions uire monetary expenditures, and the expenditures that are made may or may not reflect the l value assigned to the resource by a person.

erent techniques can be used to estimate values a person assigns to a resource based on enditures to travel to see the resource, or other related expenditures. In cases in which no enditures are made, it is possible to ask people directly how much they would be willing to to protect the resource. Unfortunately, these techniques are subject to a wide variety of cisms and may be applicable only in certain settings. (Section 5 provides a more detailed ussion on estimation techniques.)

Issues Specific to the Western Pacific Pelagic Fisheries

Hawaiian archipelago provides habitat to a variety of threatened or endangered species, uding black-footed and Laysan albatrosses, five species of sea turtles, and the Hawaiian monk . In addition, the health and vitality of certain other mammal species not listed as threatened ndangered are of interest in the context of pelagic fishery management strategies (PF26). rts to protect species will impose costs on western Pacific pelagic fisheries participants, but sumably will benefit the species themselves, as well as U.S. citizens (in terms of the value se people put on conservation of these species).

mating values for the sea turtles and seabirds in question would require that many llenging issues be resolved regarding the different types of value that should be considered the estimation procedures to be used (value types[2] and estimation procedures are discussed ection 4). Due to controversy surrounding many of the different types of value that could be sidered and methodologies that could be used, a quantitative analysis of the value of the sea les, seabirds, and other species of concern would have to be conducted with care (the plexities of conducting such a process for sea turtles and seabirds are discussed in the owing subsections). The time needed to collect the necessary data exceeds the time allowed this EIS.

---

[2] Types of economic value include bequest value (the value of preserving a resource), discovery value (potential onal, scientific, or other value), direct use value, existence value, indirect use value (value in production of a marketable modity), and option value (the value today of preserving the ability to use a resource at a later date).

2.1 Sea Turtles

Estimating values for leatherback, hawksbill, green sea, and loggerhead turtles would need to consider numerous value types and, as a result, would require several different estimation procedures. While sea turtles are protected under the ESA, the International Union for the Conservation of Nature and Natural Resources, and the Convention on International Trade in Endangered Species (CITES), sea turtles and sea turtle eggs are still harvested by indigenous people in various countries. For example, a legal egg harvest exists in Costa Rica (PF77). Such subsistence and/or cultural activities imply a direct use value for sea turtles. At the same time, the large number of volunteer organizations dedicated to sea turtle conservation shows the presence of existence, bequest, and other non-use values. In addition, expenditures related to ecotourism (to visit beaches with turtles, to dive in areas where turtles are present, and so on) show a passive value of some form – be it use or non-use.

Unfortunately, such values have not been estimated for Pacific sea turtles and are, therefore, unavailable for this EIS. Nonetheless, simply elaborating on the source of values and the possible impact of proposed fishery management regulations on these values should be useful in decisionmaking.

2.2 Seabirds

It would be possible to estimate the value of black-footed and Laysan albatrosses, as well as other seabirds affected by pelagic fisheries. As with sea turtles, however, a number of different approaches would need to be followed if such an attempt were made. Historical data from the sale of albatross feathers and eggs in the early 1900s could be used to estimate potential use values if the populations were restored. Expenditures by bird watchers to view the different albatrosses and other seabirds of the western Pacific reveal a willingness to pay – a measure of benefit – to observe the birds in their natural habitat. As with sea turtles, this enjoyment of the species could be described as existence value, bequest value, or some other type of value. Estimates of this value could be determined through a well constructed contingent valuation study. Other values that could be considered include scientific or discovery value.

3 General Discussion of Non-Market Valuation

Nonmarket valuation is the economic assessment of the value of goods and services for which market data (for example, sales receipts or some other measure of what an individual is willing to pay for a particular item) are not available. Such assessments are needed to compare the cost of actions (such as fishery management decisions) with the benefits of those actions – when benefits cannot be measured easily by changes in well-monitored revenue streams or other obvious ways.

One area in which non-market valuation techniques are most useful, and an area that has been a primary impetus for development of such techniques, is assessment of environmental values. In ny ways, non-market valuation and quantitative analysis of environmental resources can be ved as being the same (PF97). The overlap between non-market valuation in general and the ntitative analysis of environmental resources in particular stems from the fact that we, vidually or collectively as a society, pay to use and to protect environmental resources in ny different ways.

ne direct, consumptive uses have an obvious price tag. For example, we may pay to consume esource directly, and we may pay to consume goods in which the resource was used as an ıt. Other uses of environmental resources are more subtle and their values are more difficult neasure. For example, we may use a wilderness area or beach for recreation. In these cases, may or may not pay a user fee, and the total expenditures related to a given activity may or not equal the value or enjoyment we receive. With threatened or endangered species, ıation can be even more problematic. Data on direct consumption of threatened or langered species are likely to be limited and perhaps dated, and the cost of protecting these cies can be significant because it may involve modifications to existing land use and business ctices.

ensive sources exist that discuss strengths and weaknesses of concepts for types of ironmental values and methodologies used to estimate the value of environmental resources, uding threatened and endangered species. The terminology and value types described in this tion are consistent with those in PF72. The description of methodologies used to estimate ironmental value is consistent with those in PF75, PF76, PF95, and other texts.

Types of Non-Market Values

ɔle 1 provides a summary of values that are often considered when estimating the value of a ticular animal species or other environmental resource.

ble 1. Types of Value

Type of Value	Description
Bequest	Value of preserving a resource for future generations
Discovery	Potential medicinal, scientific or other value of a resource that might be discovered in the future
Direct Use	Use value associated with a resource, such as fish or timber
Existence	Value associated with the existence of a resource
Indirect Use	Value a resource provides in the production of a marketable commodity
Option	Value today of preserving the ability to use a resource at a later date

: Other values discussed in other contexts, such as preservation of salmon, include cultural (heritage) and religious (ceremonial) value. It is lear whether these types of value are subsumed by one of the value types listed in Table 1 or should be considered distinct.

st, if not all, of the value types shown in Table 1 generate some degree of tension among lysts. For example, debates are ongoing about the validity of different types of values, and different authors offer different interpretations for some of the values. For example, option value is sometimes defined as a risk premium arising from uncertainty as to the future value of a commodity. Alternative definitions of option value focus on the concept of irreversibility (see, for example, the different discussions about option value in PF72 and PF26). Other debates related to value types include discussions about whether specific values are knowable or measurable at all, and if they are, whether they are additive or what their relationship to one another might be. In most cases, the assumption is made that the total economic value of a giver resource is the sum of the different types of value shown in Table 1.

PF72 posits that the total value of a threatened or protected species is equal to the sum of the total economic value and the nonhuman value. (The total economic value in this context is the sum of direct use, indirect use, option, discovery, bequest, and existence values.) The controversy surrounding this definition relates to the two-part assumption that it is possible to estimate the value that a species may have that is separate and distinct from values assigned by humans, and that this value may be added to the total economic value of a species to reveal the true total value (what Chapman calls the total environmental value).

5 Methodologies for Estimating Non-Market Values

This relatively detailed discussion about methodologies for estimating non-market values is included in the DEIS to describe the work that would be needed to estimate the value of sea turtles and seabirds affected by the western Pacific pelagic fishery. Without proper consideratior of how to measure benefits associated with species preservation, the temptation exists to think about value in terms of cost, even though the costs and benefits of a given action are very distinct.

Methods used to estimate the values that people place on environmental assets, and the other (non-anthropocentric) values those assets may have, can be placed in two broad categories: direct and indirect approaches. In PF75, Pearce and Moran note that the direct approach includes "techniques which attempt to elicit preferences directly by the use of survey and experimental techniques.... In contrast, indirect approaches are those techniques which seek to elicit preferences from actual, observed market-based information."

5.1 Direct Approaches

Direct approaches include experiments and questionnaires, with questionnaires more common in the recent past. Questionnaires commonly used to determine values of environmental assets include questions designed to elicit a ranking for an asset relative to other goods – at least one o which has a known or observed value – and questions designed to elicit actual values (examples of survey questions are in PF 75).

The primary method by which preferences and values are measured directly is commonly referred to as the contingent valuation method (CVM). CVM is popular because it allows ndividuals to state preferences regarding non-use values. (A CVM study could be conducted to determine people's willingness to pay to ensure protection or increase the probability of survival of particular species.) Most economists agree that CVM yields reliable estimates of value when used in the proper context, provided that proper guidelines are followed and care is taken in the design of the experiment.

A "blue ribbon" panel of economists prepared a report for the National Oceanic and Atmospheric Administration (NOAA) on the merits, limits, and proper use of CVM (PF73). The NOAA committee concluded that the best prospects for use of CVM are in attempting to find values for environmental gain in circumstances where those offering value estimates are familiar with the resource(s) in question, such as local recreation amenities. CVM may not be as useful when estimating the value of an environmental asset that has been lost, or in circumstances in which there is a great deal of uncertainty.

Despite favorable comments by the NOAA committee and others on the use of CVM under certain circumstances, CVM is not universally accepted as a valid means of estimating the value of environmental assets (PF95). Criticisms range from concerns about specific biases and information problems to concerns about the psychological and cognitive processes by which people have formulated responses to CVM questionnaires (PF 75). CVM continues to be refined and often is the only option to address certain values, but typically is not used in natural resource damage assessment cases and other settings where non-market valuation is a critical issue.[4]

5.2 Indirect Approaches

Indirect methods for estimating the value of an asset include the travel cost method, hedonic analysis, and consideration of replacement costs. Each of these approaches uses actual expenditure data related directly or indirectly to the asset or resource in question.

The travel cost method uses observed expenditures, such as the cost of traveling to a recreation area, as a starting point for estimating the value of the asset. This approach reveals information about the value of specific activities. In particular, it reveals a minimum value for specific use values. It does not reveal information about non-use values such as bequest value or option value (because such values need not be related to a trip). Uncertainties about this approach are associated with valuing the time involved in traveling to a site and partitioning travel costs when a trip includes more than one activity. For example, it is not clear exactly how to value the time of different individuals who travel to a particular recreation area and what portion of their travel costs should be attributed to one area if they visit multiple sites in one trip (PF107).

With respect to the western Pacific pelagic fishery, the travel cost approach (or some variant) could be used to estimate the value people place on observing sea turtles and seabirds, and it could be used to estimate the value of sport and recreational fishing that could be affected by changes to the western Pacific Pelagics FMP. PF104 and PF101 provide examples of how the travel cost method has been used to estimate the value of recreational fishing at a particular location and, separately, the value of a resource used for viewing (or other passive activities). PF105 and PF106 discuss spatial limits and other factors that must be considered when employing the travel cost method.)

---

[4] While NOAA convened the "blue ribbon" panel on contingent valuation in 1993 (PF 73), NOAA subsequently revised the language in the Oil Pollution Act (Title 33 US Code, Section 2701) to promote an assessment of natural resource damages based on the cost of restoration rather than non-market valuation techniques.

Hedonic analysis is based on the assumption that a given asset or resource can be viewed as the sum of the attributes of the asset or components of the resource, and that value estimates for the whole can be used to determine value estimates for the attributes or components, or vice versa. More specifically, hedonic analysis is the process by which economists determine an implicit price for a particular attribute by examining markets in which those attributes are effectively traded (PF 75). For example, views, peace and quiet, and other attributes are traded effectively in the real estate market since purchasers of homes and other real property consider these attributes in the prices they pay. Homes that are similar in every way except for a view or some other attribute often sell for different prices, providing insight into what people are willing to pay for the attribute itself. The fact that value estimates are based on well defined decisions and markets makes this approach very appealing. However, the data requirements are substantial and opportunities for use can be limited.

As the name suggests, the replacement cost approach bases the value of a resource or asset on the cost needed to replace or restore that resource if it is damaged. For example, the value of eelgrass damaged by the propeller of a marine vessel could be derived from the cost of replacin the grass (and addressing other damage associated with the propeller scar). In many cases, such cost estimates are available from other case studies, or direct estimates can be made for the necessary activities. In these cases, the replacement cost approach provides a lower bound for the value of the damaged resource. However, there are instances in which there is no preceden for propeller damage and no case studies from which to base estimates. For threatened or endangered species, there may also be no way of "fixing the problem" and, therefore, no way t obtain an estimate of the work necessary to replace or restore the resource.

5.3 Other Valuation Methodologies

Pearce and Moran (PF75) describe the dose-response technique as an indirect method for estimating environmental values. The technique is based on the relationship between environmental damage and the known or observed cause of that damage. The cause of the damage is referred to as "dose" and the damage is defined as "response." If the dose has an observed or quantifiable value, then that value can be transformed through a dose-response function to yield an estimate of the environmental damage.

The approach is appropriate when environmental changes have had impacts on marketable goods, or changes in production processes for marketable goods have had impacts on environmental resources. As with the travel cost method, this approach typically is not isidered appropriate for estimating non-use values. Informational requirements for this proach include specific information on the economic, physical, and biological relationship ween the environmental damage and the market activity, as well as the correct dose-ponse function to be used. In the case of a fishery, for example, the release of a hazardous stance could have a measurable effect on the stock of fish and observable declines in fish vests (commercial or sport). The economic impact of the reduced harvests could be assigned ı cost of the release. However, this economic impact may not be the total cost of the release cause there may have been other consequences in addition to the reduced harvests.

ome circumstances, estimates of value obtained from direct observation or careful study of a ource in one area may be transferred or applied to the same resource in another location. s approach is called the benefits transfer method. In this method, the value of a resource at e location can serve as a surrogate for the value of the same or similar resource in another ation.

r such transfers to be appropriate, care must be taken to ensure that the resources being ated are indeed quite similar (in as many ways as possible) and that value estimates are usible. For example, if the socioeconomic conditions, geographic conditions, and other tors behind the available estimate are the same as or very similar to those associated with the ource in question, then the known estimate can be transferred or used as a surrogate. The re that conditions differ, the less valid is the transfer. Uncertainties with this approach volve around the issue of similarity and the fact that no two situations are ever exactly the ne. This methodology may not be appropriate in estimating the value of a threatened or dangered species, because the benefit estimate that is available for transfer would also need to for a species that is threatened or endangered, with similar socioeconomic factors, sources of certainty or risk, etc.

her strategies for estimating the value of certain actions may not be appropriate. These ategies include using the cost of an action as a measure of its value. For example, it can be npting to equate the cost to fishers from management changes in the western Pacific pelagic neries with the value of preserving selected sea turtles and seabirds. Variations on this concept lude the idea that the cost of the regulations represents some lower bound on what people e willing to pay for the regulations, and the idea that the costs represent what one segment of ciety is willing to impose on another segment to have the benefits of the regulations.

timately, there are no such relationships between the cost and benefits of any given action. hile it may be important to be able to compare the costs and benefits of an action (for ample, to be able to determine whether the action is desirable), and it is preferable for the nefits to exceed the costs, costs need not give an indication of value. Indeed, some things that e quite valuable have very little cost and vice versa.

e proper framework for comparing the costs and benefits of a particular action is a benefit-st analysis. In the case of the western Pacific pelagic fisheries, the cost of management changes could be compared to the benefits of protecting the habitat of sea turtles, seabirds, and other species. The benefits would be estimated with the procedures described in Section 5. The cost of the actions would be estimated from changes in expenditures and revenues for the fishers, taking into consideration other alternatives that would be available to fishers and others affected by the changes (in particular, allowing for substitution and other adjustments). Until these costs and benefits are properly estimated and compared, little can be said about whether the costs might exceed the benefits or how they actually relate to each other.

6 Conclusions

The value of sea turtles, sea birds, and other species of concern in the pelagic fisheries of the western Pacific could, at least theoretically, be estimated. The resulting values could be used in a benefit-cost analysis to assess the net value of species preservation. However, none of these values has been estimated, and to do so would exceed the time available for preparing this DEIS.

Some species may provide value to humans through direct use, indirect use, and passive or non-use activities. Some may also have a scientific value insofar as they may yield insights or prove useful in the future in biological or chemical processes that are of value to humans.[5] In addition, species may have some form of existence value separate from other values they have for humans.

Quantitative analysis of the value of threatened or endangered species can require the use of several different estimation techniques. In some cases, direct methods can be used to estimate the value of specific direct use activities. For example, current and/or historical market data on the value of turtle eggs or albatross feathers could be used to estimate the value of certain subsistence and ceremonial activities. Other methodologies would be needed to consider other types of value. A contingent valuation study would be needed to determine how much people value the fact that sea turtles exist (regardless of whether they expect to ever see a sea turtle), what the bequest value might be, and what the option value might be. Finally, indirect methods may be useful if surrogate market data are available. For example, expenditures by tourists who want to see sea turtles give some indication of the value these tourists place on being able to see a sea turtle in its natural habitat.

Due to controversy surrounding the different value types and methodologies, it is necessary that any quantitative analysis of the value of the sea turtles, seabirds, or other species or natural resources of concern be conducted with care. The cost and time needed to conduct such careful studies are beyond the scope of this DEIS and the ensuing EIS.

---

[5] For example, in 1963, researchers at the Research Triangle Institute and National Cancer Institute discovered that the bark of the Pacific yew tree was a source of an extract that exhibited anti-tumor activity. However, the use of the active ingredient in the extract as a medicine to fight breast and ovarian cancer was not discovered until 1989, and it was not until 1992 that supply, purity, and production issues could be resolved–making the Pacific yew a true source of an anti-cancer drug and underscoring its science value. (PF64)

APPENDIX P

Excerpt from the Biological Opinion of the U.S. Fish and Wildlife Service for the Effects of the Hawai‘i-based Domestic Longline Fleet on the Short-Tailed Albatross *(Phoebastria albatrus)*, U.S. Fish and Wildlife Service, November 2000.

CONCLUSION

r reviewing the current status of the short-tailed albatross, the environmental baseline for the
n area, the effects of the Hawaiian longline fishery and the cumulative effects, it is the
ice's biological opinion that the Hawaiian longline fishery, as proposed, is not likely to

jeopardize the continued existence of the short-tailed albatross. No critical habitat has been designated for this species, therefore none will be affected.

At the current population level and the current population growth rate, the level of mortality expected to result from this fishery, as described in Pelagic Fisheries of the Western Pacific Region-1997 Annual Report (October 1998) for this action, is not thought to represent a threat the species' continued survival. However, in the event of a major population decline as a resu of a natural environmental catastrophe or oil spills, the effects of longline fisheries on short-tailed albatross could be serious. Independent of exceeding incidental take, such an event wou represent new information, resulting in the need for reinitiation of this consultation.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the tak of endangered and threatened species, respectively, without special exemption. Take is define as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habi modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as tak that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by NMFS so tha they become binding conditions of any authorization of the fishery as appropriate, for the exemption in section 7(o)(2) to apply. NMFS has a continuing duty to regulate the activity covered by this incidental take statement. If NMFS (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the per or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms a conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impa of incidental take, NMFS must report the progress of the action and its impact on the species t the Service as specified in the incidental take statement [50 CFR §402.14(I)(3)].

Amount or Extent of Take Anticipated

The Service anticipates that 15 short-tailed albatross may be taken during the seven-year peri dressed in this consultation, based on an estimate of 2.2 birds per year, from 2000 through 06, as a result of the Hawaiian longline fishing activities regulated by NMFS. The incidental ke is expected to be in the form of mortality or injury. The Service expects that documentation this take will be a rare event due to the low current level of observer coverage (about 4.3%) d the low current rate of observer effort dedicated towards observing the setting of longline ar (about 3% - 10 % of each set), which is the time when most seabirds are affected by ngline gear. The Service considers the observation of a short-tailed albatross in the vicinity of e vessel, actively looking for food, to represent an unknown number or index of short-tailed batross that may be taken in the Hawaiian longline fishery. Given NMFS's low level of server coverage and the absence of reported observed takes of short-tailed albatross by the waii longline fishery, the Service is not able to calculate the rate at which short-tailed batross forage for bait on hooks or "strike a hook," and the number that these observations may present in terms of birds actually killed or injured. To better understand the rate at which birds ike at hooks and are killed or injured, such taking will be considered in compliance with this cidental Take Statement.

e Service defines "interaction" as observation of a short-tailed albatross striking at the baited oks or mainline gear when the vessel conducts setting or haulback operations. Because an eraction is a behavior that has been documented to precede take in the form of injury or rtality in Laysan and black-footed albatrosses, for the purposes of this biological opinion, an eraction will be considered to represent a take of a short-tailed albatross. To summarize, her an interaction or an observed injury or mortality constitutes the take of a short-tailed batross for this biological opinion only.

e Service will not refer the incidental take of any migratory bird (in this case, short-tailed batross) for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712), if such take is in compliance with the terms and conditions (including amount d/or number) specified herein.

fect of the Take

e Service has estimated that about 2.2 short-tailed albatross per year (or 15 for the duration of s consultation) may be taken as a result of the proposed action from the year 2000 through 06. However, this is only an estimate, based on certain assumptions relative to the bird's navior and appearance within the area of the Hawaiian islands and its possible interaction with Hawaiian longline fishery.

e Service does not believe that this level of take is likely to result in jeopardy to the species, will it result in destruction or adverse modification of critical habitat, as critical habitat is not ignated in the project area.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impact of the incidental take of short-tailed albatrosses:

I. Minimize attraction of short-tailed albatross to fishing gear used by the Hawaiian longline fishery.
II. Monitor the level of take and measures to minimize take.
III. Ensure survivability of injured short-tailed albatrosses.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, NMFS must comply with t following terms and conditions, which implement the reasonable and prudent measures described above and specify reporting requirements. These terms and conditions are non-discretionary.

In order to implement reasonable and prudent measure I above, the following terms and conditions apply:

I.A. Implementation Timeframe: NMFS shall promulgate regulations that require Hawaiian longline fishing vessels to comply with all seabird deterrent-related measures in the ter and conditions of this biological opinion, where said fishing activities overlap with the known range of the short-tailed albatross, whether fishing activities occur within the E or in international waters (*e.g.*, high seas). Final regulations shall be implemented no later than April 15, 2001 or the resumption of the directed swordfish or mixed fisheries whichever comes first.

I.B. Seabird Deterrent Measures: NMFS shall require and implement the following mandatory seabird-deterrent measures for all Hawaii-based longline vessels, according set type, operating north of 23° north latitude. For the purposes of this opinion, the Service adopts the NMFS definition of set types for both deep sets and shallow sets, when deploying Hawaiian longline gear. This definition is described in the *Federal Register* (Vol.. 65, No. 214, November 3, 2000, pages 66186 - 66188).

Summary of Seabird Deterrent Measures by Set Type (NMFS Defined)

Seabird Deterrent Measure	Tuna (Deep) Sets	Swordfish/Mixed (Shallow) Sets
Thawed Baits	Required	Required
Blue Dyed Baits	Required for all Baits	Required for all Baits

Discharge Offal	Required	Required
Night Sets	Optional	Required
Line Setting Machine with weighted branch lines (minimum weight = 45gm)	Required	Optional
Weighted Branch Lines (minimum. weight. = 45gm)	Optional	Optional
Towed Deterrent	Optional	Optional

.(1). Hawaii-based longline fishers must employ the following mandatory measures, by set type, when setting and hauling the longline gear north of 23° north latitude:

a). Blue-dyed and thawed bait (Mandatory For All Types of Sets):
An adequate quantity of blue dye must be maintained on board, and only bait dyed a color that conforms to WPRFMC/NMFS standards may be used. All bait must be completely thawed and dyed blue before the longline is set. Blue-dyed and thawed bait shall be employed by all Hawaii longline vessels that conduct tuna (deep), swordfish or mixed (shallow) sets.

b). Discharge offal strategically (Mandatory For All Types of Sets):
While gear is being set or hauled, fish, fish parts or bait must be discharged on the opposite side of the vessel from which the longline is being set or hauled. All hooks must be removed from offal and spent baits prior to discharge. If a swordfish is landed, the liver must be removed and the head must be severed from the trunk, the bill removed and the head cut in half vertically. The heads and livers must be periodically thrown overboard on the opposite side of the vessel from which the longline is being set or hauled. Because the supply of offal may be low when fish catch rates are low or tuna are the target species, this mitigation method requires the preparation and storage of offal for use during the longline set. Discharge offal strategically shall be employed by all Hawaii longline vessels that conduct tuna (deep), swordfish or mixed (shallow) sets.

c). Night setting (Mandatory For Shallow Sets, Only):
The longline set must begin at least one hour after sunset and the set must be completed by sunrise, using only the minimum vessel lights necessary for safety. Night Setting shall be employed by all Hawaii longline vessels that conduct swordfish or mixed (shallow) sets.

d). Setting Machine with weighted branchlines (Mandatory For Deep Sets, Only):
The longline must be set with a line-setting machine (line shooter) so th the longline is set faster than the vessel's speed. In addition, weights of least 45 grams must be attached to branch lines within one meter of eac baited hook. Setting Machine with weighted branchlines shall be employed by all Hawaii longline vessels that conduct tuna (deep) sets.

I.B.(2). Hawaii-based longline fishers may employ the following measures when setting ar hauling the longline gear north of 23° north latitude:

a). Weighted Branch Lines (Optional):
At least 45 grams of weight may be attached to branchlines within one meter of each baited hook. Weighted branchlines may be employed by Hawaii longline vessels that conduct tuna (deep), swordfish or mixed (shallow) sets.

b). Towed Deterrents (Optional):
A line with suspended streamers (tori line) or a buoy that may conform Council/NMFS standards may be deployed when the longline is being s and hauled. Towed deterrents may be employed by Hawaii longline vessels that conduct tuna (deep), swordfish or mixed (shallow) sets.

I.C. Annual Workshops: NMFS shall conduct annual workshops to inform fishers of the ris of mortalities in the Hawaiian longline fishery to short-tailed albatross. At least one annual workshop will be conducted each year, beginning in 2000. The workshops will include: information exchange between NMFS, the WPRFMC, and fishers about: (1) t use of effective seabird deterrent devices in the fishery, and (2) status of the short-taile albatross population and observations of the bird in the vicinity of the Hawaiian longli fishing area. Translations will be provided to Vietnamese and Korean speaking fishers with regards to all educational materials distributed to vessel captains.

NMFS shall report to the Service the results of the annual workshop with respect to the (a) topics discussed (*e.g.* seabird deterrent devices/strategies), (b) list of participants, (date, time and location of the workshop.

I.D. Albatross Species Identification Card: Develop plastic-coated, weatherproof, cards tha illustrate albatross species (e.g., short-tailed, Laysan and black-footed albatross) for identification purposes, and distribute them to all fishers in the Hawaiian longline fishi fleet. The card should be translated to the Korean and Vietnamese languages and distributed to those fishers whose first language is either Korean or Vietnamese.

order to implement reasonable and prudent measure II above, the following terms and nditions apply:

A. Annual Reporting: NMFS shall report annually the observed and estimated total number of interactions of Laysan and black-footed albatross, and observed take of short-tailed albatross, by fishing set type (i.e., deep sets [tuna] or shallow sets [swordfish/mixed] as defined by NMFS). The information about interactions between only short-tailed albatross and Hawaiian longline gear would not provide us or NMFS with sufficient information to gauge the effectiveness of the various combinations of seabird deterrent measures/devices. Therefore, to gauge the effectiveness of these seabird deterrents it is appropriate to collect data from surrogate species (*e.g.* Laysan and black-footed albatross) that exhibit similar foraging behavior to the short-tailed albatross. NMFS currently records observed interactions and estimates total number of interactions for these species.

In addition to reporting interactions and any take as noted above, NMFS shall evaluate the effectiveness of seabird deterrent measures in reducing interactions with short-tailed albatross by measuring the rate at which Laysan and black-footed (and short-tailed, if any) albatross are caught by Hawaiian longline vessels. NMFS shall evaluate and report on the effectiveness of the seabird deterrent regime on an annual basis.

Within two months from the end of each fishing season (example: fishing season is 2000, the report would be due by March 1, 2001), NMFS will report to the Service on the effectiveness of seabird deterrent measures. The report shall include (by each trip observed and summarized over all trips observed) all reported observations and mortalities of Laysan, black-footed, and short-tailed albatross, including date, time, location, vessel, vessel type, vessel size, trip type (i.e., swordfish, tuna, or mixed), gear description, total number of hooks deployed, total number of trips observed, and all observer or reported comments. Annual reports shall be submitted by March 1 of the year following the reporting year (i.e., the report for the calendar year 2000 would be submitted by March 1, 2001, etc.) to: Field Supervisor, U.S. Fish and Wildlife Service; Pacific Islands Office; 300 Ala Moana Boulevard; Room 3-122, Box 50088; Honolulu, Hawaii 96850; telephone (808) 541-3441, facsimile (808) 541-3470.

In the event a NMFS observer sights a short-tailed albatross during an observed trip, NMFS shall make arrangements for the Service to interview the observer. The interview will occur no later than 30 days from the time the fishing trip ended. The NMFS shall make available to the Service copies of all information (*e.g.* records, pictures) collected by the observer about the sighting.

. (1). Gradual observer coverage implementation: There will exist two sources for the collection of albatross data and observations. Observer Coverage for short-tailed albatross and other endangered species: This coverage will be provided by NMFS observers whose primary duties will be to observe short-tailed albatross and other endangered species during sets and haulbacks. Fishery related activities will be considered a secondary duty and may be performed when observer duties for short-tailed albatross and other endangered species are completed. Observer Coverage fo other endangered species and fishery related activities: This coverage will be provided by NMFS observers whose primary duties involve observing other endangered species and conducting fishery related activities during sets and haulbacks. Given their commitment to these primary duties, observers will monito sets and haulbacks for short-tailed albatross as a secondary duty, to the maximum extent practicable.

NMFS shall provide observers whose primary duty is to observe short-tailed albatr and other endangered species, for at least 5 percent of all Hawaiian longline fishin trips that occur above 23 degrees north latitude. A representative number of fishin trips that make shallow sets (swordfish/mixed species) and deep sets (tuna species) will be covered by observers. Beginning in 2001, at least 1 percent of all Hawaiia longline trips that operate in waters north of 23 degrees north latitude shall include NMFS observer whose primary duty is to observe short-tailed albatross and other endangered species; in 2002, at least 3 percent of all Hawaiian longline trips that operate in waters north of 23 degrees north latitude shall include a NMFS observer whose primary duty is to observe short-tailed albatross and other endangered speci and in 2003, at least 5 percent of all Hawaiian longline trips that operate in waters north of 23 degrees north latitude shall include a NMFS observer whose primary d is to observe short-tailed albatross and other endangered species. Observer covera shall remain at this level, five percent, through the culmination of the consultation period on December 31, 2006.

(2). Observer coverage for short-tailed albatross and other endangered species: NMFS observers whose primary task is to observe short-tailed albatross, and other endangered species, shall observe all sets in which Hawaiian longline gear is deployed. Also, NMFS observers will observe at least every fourth haulback (*e.g.* haulback #1, 5, 9 etc.), in its entirety, for short-tailed albatross, and other endanger species. Details of specific seabird duties are described in II. C.

(3). Observer coverage for other endangered species and fishery related activities: NMFS may employ observers whose primary duties may include observing other endangered species or fishery-related activities. As a secondary duty, these observ shall observe short-tailed albatross during longline gear deployment (set) and retrieval (haulback) to the maximum extent practicable, given their commitment to other primary duties. Details of specific seabird duties are described in II. C.

C. Short-tailed albatross observer duties: These duties apply to both types of observers as described in II.B.(2) and (3). NMFS shall deploy observers aboard Hawaiian longline fishing vessels with the responsibility of recording seabird behavior and interaction with longline gear during the period of this consultation. NMFS will hire qualified biologists that have received training or experience in ornithology, or extensive seabird observation experience, with emphasis on seabirds of the Pacific. NMFS will ensure that observers will be deployed on Hawaiian longline fishing vessels during regularly scheduled fishing trips. If a trip is terminated prematurely, the observer will be placed aboard another Hawaiian longline fishing vessel as soon as possible. Observers will be placed on vessels that conduct a majority of their fishing operations within the known range of the short-tailed albatross. Observers will be placed aboard Hawaiian longline fishing vessels beginning with the implementation of seabird mitigation regulations for this fishery.

NMFS observers shall record sightings and behavior of short-tailed, Laysan and black-footed albatross during the set and haulback of the main line. Observers will record seabird sightings and behavior in the vicinity of the longline gear during longline setting operations, until the observer deems that seabirds are no longer observed in the vicinity of the deployed fishing gear, or in the case of night sets, that the observer can no longer distinguish between seabird species. Similarly, observers will record seabird sightings and behavior in the vicinity of longline gear during longline haulback operations, until the observer deems that seabirds are no longer observed in the vicinity of the fishing gear being retrieved.

NMFS observers shall monitor sightings of short-tailed, Laysan and black-footed albatross on or near longline gear. NMFS observers will consider observations and takes of short-tailed albatross, and other endangered species, to be the top priorities over other observer duties. The observer will record the behavior of the short-tailed albatross and other seabirds observed, describing their location in relation to the longline gear, and whether they attempt to strike at the gear to "steal bait," and whether they are either hooked onto or injured by the gear. The observer will record their behavior, the species of each bird that attempts to strike at fishing gear, and record the number of strikes at the fishing gear per set and per haulback. The observer will record the number of albatross, by species, that are hauled back on longline gear. The observer will record whether the albatross was killed or injured during the haulback. If the albatross was recorded as injured, the observer will describe the extent of the injury to the best of their ability. In addition to the above-mentioned information, written reports will include: the date of the set, the type(s) of seabird deterrent measures used, weather conditions (wind velocity, precipitation, visibility and sea state), time set began and ended, latitude and longitude the set began and ended, number of hooks set, bait type (and whether it was frozen or thawed), amount of weight on hooks, number of birds within the vicinity of the vessel at the beginning of the set, bird behavior before and during set, time haulback began and ended, latitude and longitude haulback began and ended, a record of the number of bird by species, touching the gear and their fate and condition. Written reports from observers shall be reported to: Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Office; 300 Ala Moana Boulevard; Room 3-122, Box 50088; Honolulu, Hawaii 96850; facsimile (808) 541-3470; telephone (808) 541-3441 no later than two months (60 days) after the fishing trip has ended.

In order to implement reasonable and prudent measure III above, and as incidental take is permitted for this listed species, the following terms and conditions apply:

III.A. NMFS shall advise fishers and observers that every reasonable effort must be made to save injured short-tailed albatross. If a short-tailed albatross is recovered alive, it must be retained unless it exhibits all of the following traits:

1. head is held erect and bird responds to noise and motion stimuli;
2. bird breathes without noise;
3. both wings can flap and retract to normal folded position on back; and
4. bird can stand on both feet with toes pointed in the proper direction (forward).

If a recovered albatross exhibits all of these traits, it should be held until dry and then released overboard. If the recovered bird fails to exhibit even one of the above traits, it must, by law, be retained aboard and the NMFS contacted immediately. The U.S. Coas Guard may be contacted to facilitate communication between the vessel and the NMFS The appropriate NMFS personnel will be contacted at any one of the following telepho numbers (by availability, in the order listed):

Lewis Van Fossen	808/973-2935 extension 214
Kevin Busscher	808/973-2935 extension 215
Charles Karnella	808/973-2937

III.B. NMFS shall instruct observers and fishers that every effort must be made to recover an dead short-tailed albatross. Specimens shall be frozen immediately, with identification tags attached directly to the carcass, and a duplicate identification tag attached to the ba or container holding the carcass. Identification tags shall include species, date of mortality, name of vessel, location (latitude and longitude) of mortality, observer or captain's name (or both), and any band numbers if the specimen has a leg band. Leg bands must remain attached to the bird.

III.C. NMFS shall inform observers and fishers that specimens must be surrendered, as soon possible to a NMFS or Service office. Specimens must remain frozen and must be shipped as soon as possible to: Vertebrate Conservation Coordinator, Ecological

Services, Pacific Islands Office, US Fish and Wildlife Service, Room 3-122, Honolulu, Hawaii 96850. The contact numbers for the Pacific Islands Office are: 808/541-3441(telephone), 808/541-3470 (facsimile).

ummary of Reporting Requirements

ease note that the following is only a summary and reporting details are included in the terms d conditions above.

NMFS shall report to the Service the results of the annual workshop with respect to the: (a) topics discussed (*e.g.* seabird deterrent devices/strategies), (b) list of participants, (c) date, time and location of the workshop (from Term and Condition I.C).

NMFS shall report annually the observed and estimated total number of interactions of Laysan and black-footed albatross, and observed take of short-tailed albatross, by fishing set type (i.e., deep set [tuna] or shallow set [swordfish/mixed] as defined by NMFS) (from Term and Condition II.A).

NMFS shall evaluate annually the effectiveness of all required seabird deterrent devices by measuring the rate at which Laysan, black-footed, and short-tailed albatrosses are caught by Hawaiian longline vessels, by set type (from Term and Condition II.A).

NMFS observers shall record sightings of Laysan, black-footed, and short-tailed albatrosses during the set and haulback of the main line (from Term and Condition II.C).

ONSERVATION RECOMMENDATIONS

ction 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the rposes of the Act by carrying out conservation programs for the benefit of endangered and eatened species. Conservation recommendations are discretionary agency activities to nimize or avoid adverse effects of a proposed action on listed species or critical habitat, to p implement recovery plans, or to develop information.

keep the Service informed of actions minimizing or avoiding adverse effects or benefitting ed species or their habitats, the Service requests notification of the implementation of the lowing conservation recommendation:

(1) NMFS should coordinate with the governments of Japan, Korea and Taiwan the collection of fishery effort and seabird bycatch information from fishing vessels that conduct fishery operations similar to U.S. fisheries that deploy gear such as longline and hook-and-line gear. NMFS should collect catch per unit effort (per thousand hooks) data from these countries through the period of this consultation. If historical catch per unit effort (per

thousand hooks) is accessible to NMFS, this information should be submitted to the Servi Concerning bycatch, NMFS should seek to obtain any and all records of short-tailed albatross that are accidentally caught by fishing vessels from these countries, and the disposition of the bird upon release. NMFS should also seek to obtain the rate at which seabirds are hooked per 1,000 hooks. These rates can be used to estimate the possible number of short-tailed albatross that may be hooked in these fisheries and the collective impact that longline fisheries may have on short-tailed albatross.

(2) NMFS should conduct a study to determine whether “C” hooks would reduce hooking related injuries to seabirds, and compare these results with hooking related injuries to seabirds caused by “J” hooks in the Hawaiian longline fishery. “C” hooks are designed to hook an animal on the jaw, thus avoiding damage to internal soft tissue. If the animal fall off the hook, it may have a greater chance at survival. If the study results indicate that “C” hooks cause fewer hooking related injuries to seabirds, then the Service would recommen that “C” hooks be selected as the only type of hook to be used in the Hawaiian longline fishery. “J” hooks are currently used in the Hawaiian longline fishery.

(3) NMFS should continue to support research into effective seabird deterrent devices and strategies that reduce risk of interaction between seabirds and Hawaiian longline gear and fishing-related activities. For example, underwater setting chutes or lining tubes that deplo gear at a depth sufficient to prevent birds from settling on hooks during gear deployment could be tested for use as a seabird deterrent. Also, Japanese tarred mainline could be teste for its effectiveness as a seabird deterrent. NMFS should coordinate with and communicat the results of these analyses to the Service. The Service would analyze the results of the research and make a determination to concur with the NMFS. If the Service concurs that t device or strategies reduces seabird interaction with Hawaiian longline gear, then the Servi may amend this biological opinion and incorporate these new seabird deterrent devices or strategies into the terms and conditions.

(4) NMFS should investigate the rate at which Laysan and blackfooted albatross “fall off” longline gear as a result of being injured, hooked, or entangled during the set. NMFS investigators should analyze the number of birds that may be injured, hooked or entangled during the set and compare this amount with the number of birds that are documented injured, hooked or entangled during the haulback. Understanding the rate at which birds may “fall off”longline gear will influence the analyses that relate to estimating the number Laysan and black-footed albatross that are killed in the Hawaii longline fishery each year. Refining these analyses will help the NMFS and Service gauge the effectiveness of the various seabird deterrent devices and ultimately, help reduce the risk of interaction between short-tailed albatross and Hawaiian longline gear.

APPENDIX Q

Excerpt from the Draft Biological Opinion on the Authorization of Pelagic Fisheries under the Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region, National Marine Fisheries Service, March 2001.

THE BIOLOGICAL OPINION ON THE AUTHORIZATION OF PELAGIC FISHERIES UNDER THE FISHERY MANAGEMENT PLAN FOR THE PELAGIC FISHERIES OF THE WESTERN PACIFIC REGION

IS AVAILABLE FROM NATIONAL MARINE FISHERIES SERVICE

f you would like to obtain a copy, contact your closest NMFS office, or access the Biological Opinion over the internet at: swr.nmfs.noaa.gov

APPENDIX R

Public Comments on the Draft Environmental Impact Statement on the Pelagic Fisheries of the Western Pacific Region: Summarized Transcript of Oral Testimony Given at Public Hearings, with Responses.

PUBLIC COMMENTS

Tracking No.	Commenter	Comment	Response
P1a	Maui - Ms Lembeck	Fishermen contribute to a fund to help endangered species, like this turtle.	The comments on the Draft EIS, both at public hearings and those submitted in writing, reflect a willingness on the part of the Hawaii longline industry to help address the problem of turtle conservation.
P1b	Maui - Ms Lembeck	Eventually you [NMFS]'re going to have to take a proactive stance in managing fisheries based on the function of the ecosystem before they become endangered. This EIS is reactive.	Comment noted. EIS considers cumulative and ecosystem linkages.
P2	Maui - Mr Hau	With the seasonal closure of all other areas to longline fishing, it sort of seems that fishermen would then move to other areas.	Agree - cumulative impact analyses point out this possibility and the potential negative consequences for turtle populations.
P3a	Kauai - Mr Hale	The expense rate for commercial and/or charter fishing, data by Hamilton in 96, 97 and 98. Vessel income versus cost breakdowns. Things have changed in those amount of years. There's a lot more number of boats fishing, fuel expenses, ice expenses, bait expenses have all gone up considerably compared to the numbers from what they're saying. Now the fuel has gone up in the last year, for diesel I pay 79 cents a gallon more at this time than I did at this time last year. The expenses they're saying is truck fuel at $11. It's $40 just to fill my gas tank in the last two days. Ice has gone up because electricity has gone up. Everything. It needs to be more researched and re-updated. It says charter boats operating out of Hawaii, five at one harbor, three at the other. Now it's more like 10 in one harbor, 10 in the other harbor and maybe 15 more that have raft permits that once in a while do this, as well as the numbers of commercial fishermen has gone up since this was done in the last three years. It's outdated information. We shouldn't be basing a 2001 decision on information that was compiled in 1996, because a lot of things have changed too quickly.	The need for updated information is discussed in Section 3.10. The analyses used best available published information. Where appropriate, it has been noted in the text that the pro forma income statements represent the situation in the late 1990s.

Tracking No.	Commenter	Comment	Response
P3b	Kauai - Mr Hale	There's a thing in here that says a lot of these charter boats are owned by big corporations with the intent of losing money. Well, that has changed. Now there's a lot of commercial fishermen guys who want to be home once in a while to see their kids grow and go to soccer games and that, so they've moved into the charter fishing industry. They're not out there to lose money. They're out there to feed their families and to pay the bills and keep a roof over their heads. Personally, I think this whole survey needs to be re-updated.	The EIS does not say that a lot of charter boats are owned by corporations. The motivation for commercial fishers is not relevant for the analysis. We used the best available sources for the analyses in this EIS.
P3c	Kauai - Mr Hale	p 3-102, bottom of 3rd paragraph, it says: Per capita seafood consumption by residents and visitors to Hawaii is twice the US average. Therefore, it is not surprising the local supply for certain grades and species of fish, demand is greater than the catch in HI waters. To meet these excess demands much fresh and frozen fish is imported to Hawaii. The main thing is basically tourism. If they have to eat fish that are brought in because the local fishermen are so restricted on all this stuff, to me that is wrong and I think some of this stuff needs to be re-evaluated.	Comment is an observation, opinion, suggestion or preference. No change required to document.
P3d	Kauai - Mr Hale	[re seasonal closure for Hawaii-based longline boats in April and May] So really, you're taking a few boats out of the picture, but the rest can still operate. So the vessels which are bigger than ours can still operate. I personally still don't see the point of closing off X number of boats, but the other ones can still fish in this two-month period. I have 14 dogs. If I feed them all, but I say five of you guys can't eat, the other ones are going to just eat all the food. So what did I save? Just five went hungry. This does not make sense.	Even if the Hawaii longline fishery is responsible for only a small portion of the total turtle mortality, NMFS must meet the legislative mandate under ESA. Fishers from other U.S. areas and foreign countries may indirectly benefit. Potential effects, including possible adverse effects on turtles, are identified and discussed in the EIS.
P3e	Kauai - Mr Hale	[re seasonal closure] Especially with Hawaii's struggling economy and the number of unemployed people we have already.	Even if the Hawaii longline fishery is responsible for only a small portion of the total turtle mortality, NMFS must meet the legislative mandate under ESA. Fishers from other U.S. areas and foreign countries may indirectly benefit. Potential effects, including possible adverse effects on turtles, are identified and discussed in the EIS.

Tracking No.	Commenter	Comment	Response
P3f	Kauai - Mr Hale	I don't see what advantage it is to close the Hawaii-based, but if I can come from California or from Taiwan or come from Mexico with my boat and make it here, I can still fish.	Even if the Hawaii longline fishery is responsible for only a small portion of the total turtle mortality, NMFS must meet the legislative mandate under ESA. Fishers from other U.S. areas and foreign countries may indirectly benefit. Potential effects, including possible adverse effects on turtles, are identified and discussed in the EIS.
P4a	Kauai - Mr Kalthoff	[re longliners] I would prefer to see them fishing but using some of the techniques that have been proven to be deterrents, such as the six or so we talked about [listed in the EIS], and maybe using more than two of them.	The EIS assumes that regulations will be forthcoming (by April 15, 2001) that implement the reasonable the prudent measures specified in the STAL BO. Three deterrents will be required for vesesls fishing north of 23° N. latitude, and this is reflected in the preferred alternative (Alternative 10), as well as Alternatives 2, 4, 5, 6 and 7.
P4b	Kauai - Mr Kalthoff	Rather than closing down areas or closing down seasons, I'd rather see them adapt their way of fishing to continue the supply. Because obviously, from what it says here [p 3-102 in DEIS] and from what we hear around here, there is not enough supply to meet the demand.	Alternatives 1, 2 and 5 have no seasonal closure. The new preferred alternative, Alternative 10, includes a seasonally-closed area, but will allow year-round fishing elsewhere. Swordfish-style fishing, however, as currently conducted, will not be permitted north of the equator.
P4c	Kauai - Mr Kalthoff	They [local restaurants]'re bringing in fish from New Zealand. I guess the thing that probably concerns me most is that a lot of these fisheries are being exploited. To restrict our fishermen over here, where obviously there's things they can do, deterrents they can use, and I think those just have to be put into practice and possibly forcibly, but I'd like to see them keep fishing.	Regulations will soon be in effect to mandate use of specific seabird deterrents. The fishing experiment included here as Option A is designed to test possible turtle deterrent measures.
P5	Kauai - Mr Medieros	[re seasonal closures] Fishing, you face the weather. There's times you cannot fish because of the weather. There's times there are no fish around and there's times when you have fish around, so then you've got to really work. You've got to make up for the time you cannot go.	The time closure period in the preferred alternative was selected to minimize potential interaction of the Hawaii-based longline fishery with sea turtles. In a practical sense, of course, weather patterns will impose their own restrictions on the fishery.

Tracking No.	Commenter	Comment	Response
P6a	AmSam - Mr Anderson	You mention here a study called Aguilar, 1992, which the study may be the best available information on sea turtle post-hooking mortality and other information regarding sea turtles. But in almost every paragraph of the summary talking about this study I see the words 'lacks detailed description', 'does not describe', 'no mention', 'does not include', 'does not report', 'uncertainties', 'not well understood', 'insufficient information.' Now, to make policy, which looks to be a govt policy that's going to affect us as fishermen, based on documents that 'do not describe' or 'do not include' really concerns me a lot.	We agree that additional research and analyses are needed. The latest information, including work done at the NMFS SWFSC-HL, is included in the Pelagics BO, and is reflected in Alternative 10.
P6b	AmSam - Mr Anderson	DEIS says that expert testimony given to the court in the CMC v. NMFS indicated that reduction of sea turtle takes and mortality in the Hawaii-based longline fishery alone would only have a minimal effect on the prospects of population viability and recovery of protected sea turtle species. It looks like we're trying to solve a world issue with shutting down a very small fishery.	We agree, and this is reflected in the cumulative impacts analyses on potential effects, including possible adverse effects on turtles, of the management alternatives. Nevertheless, even if the Hawaii-based longline fishery is responsible for only a small portion of the total turtle mortality, NMFS must meet the legislative mandate under ESA. Fishers from other U.S. areas and foreign countries may indirectly benefit. Potential effects, including possible adverse effects on turtles, are identified in the EIS.
P6c	AmSam - Mr Anderson	Most of these courses of action that are mentioned in here includes things like having to set deeper gear. *Alias*, particularly, shoot shallow gear, they don't have line setters. And that's the fish they're targeting, albacore, and our fishery are more of a surface-feeding species. I think this could have some very detrimental effects on us here in American Samoa.	One intent of the Pelagics BO, and of Alternative 10, is to eliminate a source of relatively frequent longline/turtle interactions, that being shallow-sets targeting swordfish in oceanic frontal zones to the north of Hawaii. The low latitude time area closure is intended to reduce interactions from deep sets targeting tuna. At this time, available data do not indicate a problem with turtle interaction with the shallow-set *alia* fleet in American Samoa. Consequently, the preferred alternative's prohibition of shallow sets applies only north of the equator.
P6d	AmSam - Mr Anderson	It said there could be a lot of boats in Hawaii that are going to say, let's go to Samoa, they have a lot of albacore and let's go get them. So I think that's what we've got to be looking at.	The preferred alternative includes the large vessel area closure and entry control date measures now being developed for American Samoa by the Council. If adopted, these measures would restrict relocation of vessels from Hawaii to American Samoa.

Tracking No.	Commenter	Comment	Response
P6e	AmSam - Mr Anderson	[re 15 July control date for entry] At the same time, we're now limiting the fishery to what's already here. Personally, I think there's a lot more room for expansion other than that.	The control date puts American Samoa longline vessel owners on notice that there may be future rule-making to establish a limited entry program. The July 15, 2000, date may or may not be incorporated in such a program.
P6f	AmSam - Mr Anderson	There's a statement mentioned in Chapter 2, it is not understood whether the subsurface albacore tuna taken in American Samoa in the small-scale longline fishery are primarily a local subpopulation or are part of a more widely distributed regional mass. My opinion, after chasing these albacore here for the past four years, I am of the opinion that they are part of a more widely distributed regional mass. These are not resident fish that we're catching here. These are fish that are moving around the ocean and we don't really know for sure where.	There is no evidence of an albacore tuna sub-population resident in the Samoa region but the possibility is the subject of scientific study.
P6g	AmSam - Mr Anderson	Alternative 7, the preferred alternative, I think is a very draconian measure. I think it over exceeds what really needs to be done. I don't see any problem in Alternative 2, to leave things as they are and to have the Council take appropriate steps as necessary as the situation develops, as issues come up, present those issues to Council, the Council decides what's fair, makes recommendations and then it becomes legitimate. Alternative 7 is very extreme. I think it's an excessive measure.	The current litigation will preclude a return to the management regime of Alternative 2. The new preferred alternative, Alternative 10, includes a time/area closure more restricted in scope than Alternative 7, but still results in the elimination of swordfish-style fishing under the Pelagics FMP north of the equator.
P7	AmSam - Mr Evans	[re 50 nm closure] At meetings, a desire was expressed, a consensus, for not only 50 nm closure around islands but also around the banks of American Samoa and I believe that desire is still strong.	The Pelagics FMP includes a "framework" procedure for adding area closures around banks through future Council and NMFS action. Information added to Chapter 2.
P8	AmSam - Mr McGuire	I suggest that the next time you hold a public meeting that you hold a public meeting that you access Channel 6 and put a video on maybe the night before so that – or two nights before, so that some of the people that are going to be affected by this, maybe it will sink in the impact a little bit if they know there's a program about what's going on and if they want to come down here and put in a public comment they have a better idea of what's going on.	Agree - Excellent suggestion. We'll look into the cost and logistics of that for future meetings in Samoa as well as elsewhere in the Region.

Tracking No.	Commenter	Comment	Response
P9a	Waianae- Mr Aila	[re cumulative effects graphic] There's no reference to Hawaiian culture, cumulative effects to the Hawaiian culture to fish – with large-scale fisheries beyond the small boat fishery. I don't see anything there that deals with that cumulative effect. We small-boat fishermen are constantly affected by the price of fish because of the amount of longline fish caught and brought in, the prices go up and down daily depending on how much is brought in. So I don't see anything listed there.	Factors that affect the price of fish in the Hawaii market are discussed in Section 3.10.2.3. The effect of a regional longline closure on the Hawaii small boat (troll and pelagic handline) fishery is treated as a direct effect and discussed in Section 4.9.8.2.
P9b	Waianae - Mr Aila	A lot has been said in the press about the longliners making the point of, why are you picking on us, what about the foreign boats, and things like that. I don't see any place in here where NMFS is saying, in order for us to take our place in the world stage we need to set an example. I think the EIS should sort of address that statement, that criticism from the longline industry that is saying, you're only picking on us, what about the others, what about the Taiwanese, what about the Koreans. The U.S. Government has to set an example with its own fishery before it can address those intl concerns, and I think this document at least starts that.	Agree - The time/area closure and gear restrictions of the preferred alternative will set an international example. The U.S. will encourage other nations to follow this example. Of more practical benefit, because of the "export" potential, will be results of any fishing experiment designed to develop turtle interaction deterrent measures.
P9c	Waianae - Mr Aila	I would like to testify in favor of the Preferred Alternative 7, but with a specific level of observer coverage, and that observer coverage be not less than 20%. You mentioned that you can't imagine that it won't be, but it should be stated in the preferred alternative and should be analyzed for what kind of an impact it's going to have on perhaps the percentage of turtles that are taken. I'd say Alt 7 without the observer coverage minimizes the value of Alt 7.	Based on information in the draft Pelagics BO, the preferred alternative (now identified as Alternative 10) has been adjusted from the Draft EIS and now specifies a minimum 20 percent level of observer coverage for the deep set component of the Hawaii-based longline fleet.

Tracking No.	Commenter	Comment	Response
P9d	Waianae - Mr Aila	Quote in Chapter 3 by McCoy and Ishihara: they briefly review the past and contemporary religious connection to sharks held by indigenous peoples in the US-flag Pacific islands. They note that much of the knowledge regarding the spiritual importance of sharks has been lost. I would definitely disagree with that statement. I think that statement should be removed. I don't think it's their place because they're not culturally qualified to make a statement like that and certainly does not belong in here. I would really like to see that removed when the next draft comes out.	Agree - sentence deleted.
P10a	Honolulu - Mr Tanoue	We are very concerned about NMFS suggesting a 2 month closure of the longline fishery. In the months of April and May 2000 we bought and sold approximately 2.5 million dollars of fresh seafood from the local auction and 90% was longline. The loss of sales and revenue will be very severe and I foresee a significant amount of jobs lost because of the closure. I request there be no closure.	The new Preferred Alternative (Alternative 10) includes a seasonally-closed area, but will allow year-round tuna-style fishing elsewhere.
P10b	Honolulu - Mr Tanoue	I have a suggestion where Earth Justice and the fishing industry can work together in a partnership. Why don't we create a fund that would be given to the Oceanic Institute to breed and raise turtles to be later released into the ocean. Instead of destroying livelihoods and spending money in court, it would create new jobs and ensure that for future generations our turtles would be saved. To fund this project, for every pound of fish that the longliners produce a certain tax would be assessed. Earth Justice would match our total contributions so that a perpetual fund can be created.	The comments on the Draft EIS, both at public hearings and those submitted in writing, reflect a willingness on the part of the Hawaii longline industry to help address the problem of turtle conservation. There has been a long history of efforts to rear sea turtles in captivity to support wild populations. Because of the complex nature of sea turtle life history, it is unclear how successful such efforts have been. In general, it is considered better to enhance natural reproduction on the nesting beaches. For leatherbacks the situation is even more difficult because leatherbacks do not adapt to captivity.

Tracking No.	Commenter	Comment	Response
P11	Honolulu - Mr Ross	Mexico fishing industry has environmental problems; in Hawaii people love the environment. Are you going to try to force us to go back to Mexico and these other countries where there's no monitoring and no programs [by closing down the fishery for two months]. How many turtles do you think they're going to kill and our financing them to expedite this increase in the fish population that we need to keep our businesses going? How many sea turtles do you think you're going to lose? A lot more than shown on these graphs here. Let's not push us over to Third World countries and make more addresses out of the sea turtle shells.	Cumulative impact analyses (Sections 4.11.7, 4.11.9) point out the possibility that fishing effort will relocate from Hawaii to unmonitored and poorly regulated fisheries outside the Pelagics FMP management area and the potential negative consequences for turtle populations.
P12a	Honolulu - Mr Barrows	I'm against the preferred alternative. It will stop all landings from longline vessels during the months of April and May. Over the last six years, 18% of my gross on my vessel has come from those two months. Last year alone 25% of my yearly gross was from those two months.	Information on the importance of fishing in April and May has been added, however, the new Preferred Alternative (Alternative 10) permits year-round tuna-style fishing outside of the seasonally closed area.
P12b	Honolulu - Mr Barrows	I am also against the abolition of swordfishing. I do believe that we can work together with NMFS and the environmentalists to solve these turtle problems. At the HLA, we are working on it. Trying to come up with different mitigation techniques and join with other people in experimental fisheries. Let's use 100% observer coverage to go out and experiment, and have a fund to get this experimental fishery going and get some mitigation techniques that work and export them to the whole world.	The Pelagics BO recommends prohibition of shallow-sets north of the equator. Option A, the fishing experiment, would allow swordfishing in a highly controlled manner while turtle interaction deterrent measures are evaluated. Under the ESA, Section 7 consultation may be reinitiated when significant new information becomes available.

Tracking No.	Commenter	Comment	Response
P13	Honolulu - Mr Kanemoto	I've recently met former crew members of foreign fishing longline vessels and during my conversations with them they've stated that when fishing aboard a foreign vessel if a turtle is caught it becomes a meal. What happens should the Hawaii longline vessels be barred or limited from fishing in those areas? More foreign vessels will fish those same intl waters and these crews, when they catch the turtles, they won't be released. These actions suggested by NMFS should be reviewed and they should take into account the number of foreign vessels that may indeed move into the restricted waters and fish and try to calculate turtle mortalities from that.	Currently, foreign vessels rarely have observers and even more rarely report interactions with protected species. The United States usually does not have access to any data that are collected. It is possible that foreign fleets have a higher mortality on captured turtles due to actions after their capture (e.g., consumption for food). Even if the Hawaii longline fishery is responsible for only a small portion of the total turtle mortality, NMFS must meet the legislative mandate under ESA. Fishers from other U.S. areas and foreign countries may indirectly benefit. Potential effects, including possible adverse effects to turtles, are identified and discussed in the EIS. Due to lack of information, projections as to actions of foreign fleets are speculative.
P14	Honolulu - Mr Costa	If the preferred alternative stands, Hawaii will still have a strong market for fresh fish. The vacuum will be filled by importing massive amounts of fish and the local trolling boats and the local handline boats will only be able to supply us with a little bit. If we as a state knowingly import tuna and other species from overseas, we will be systematically supporting an advanced level of turtle interaction as some foreign fleets have no EIS, no observers, or blind observers as they're called, and some nations actually target turtles.	The comment is an observation, opinion, suggestion or preference. No change required to document.
P15a	Honolulu - Mr Achitoff	The preferred alternative without the option of an experimental fishery will apparently be effective in substantially reducing the catch of turtles and seabirds.	The catch of seabirds will be substantially reduced by implementation of the deterrent measures prescribed by the STAL BO. These would attach to any selected alternative. In the short-term, a fishing experiment would delay a portion of the turtle take reduction while data are collected. However, an experiment has a large, long-term potential to decrease turtle takes both domestically and by foreign fleets. The net long-term benefits of a fishing experiment may be potentially greater than the benefits resulting from a ban on shallow sets by the Hawaii-based fleet.

Tracking No.	Commenter	Comment	Response
P15b	Honolulu - Mr Achitoff	Alternative 7 does not eliminate the catch of turtles, and currently the largest threat to the turtles is commercial fisheries. Not just this fishery, but this fishery (and all components of Hawaii longline) contributes to the problem. Allowing any continued killing of turtles is legally questionable (as NMFS acknowledged in CA/OR BO), so allowing a viable tuna longlining fishery to continue is a compromise.	The EIS identifies and discusses the varied sources and causes of turtle mortality including actions occurring at nesting beaches. The Pelagics BO establishes "Reasonable and Prudent Measures" to afford necessary protection to turtle populations.
P15c	Honolulu - Mr Achitoff	Re option of an experimental fishery, while doing it in general is a good idea, this is not a viable alternative from a strictly scientific point of view in the HI swordfish longline fishery. It is not going to give the kinds of statistically reliable results that are needed so that anyone can know whether it's circle hooks or blue dyed bait, or whatever it is, is an effective way to catch fish without catching turtles.	The description of Option A in the EIS has been expanded to provide details necessary to generate statistically reliable conclusions.
P16a	Honolulu - Mr Kraft	Hawaii is a leader in various seafood aspects. A great proposal was brought up by Glenn [Tanoue] to have a fund to finance turtle research to release turtles into the wild to help preserve them. I think that the longline fishery could be very active and proactive in developing techniques and methodology for not only avoiding interactions with turtles, but also in mitigating any harm that comes to them.	If Option A is implemented, the Hawaii-based longline fishery will be at the forefront of turtle interaction deterrent development. If not, research will be inhibited.
P16b	Honolulu - Mr Kraft	Instead of destroying the Hawaii longline fishery, which is what the preferred alternative would do, you can't hold your breath for one sixth of the year [i.e., seasonal closures] and expect to survive. This preferred alternative does not take into effect the economic impact which makes the entire fishery highly unstable.	Information on the importance of fishing in April and May has been added. Howeverm the new Preferred Alternative (Alternative 10) permits year-round tuna-style fishing outside of a seasonally closed area.
P16c	Honolulu - Mr Kraft	I question the use of the word 'take.' I think the word take misleads the public. It's an interaction. I think the terminology is skewed against the fishery and I resent that.	"Take" has a specific statutory meaning in relation to protected species. Therefore, within the context of this EIS this term must be used.
P16d	Honolulu - Mr Kraft	We need to come up with something that brings in cooperation and actually solves the problem that may exist, if we can define what that is.	The only cooperative effort currently anticipated is Option A. Favorable results in that experiment could well be grounds for re-initiating Section 7 consultation, revising the Pelagics BO, and revised incidental take levels.

Tracking No.	Commenter	Comment	Response
P17a	Honolulu - Mr Martin	The efforts in the Pacific of the Hawaii-based longline fleet basically consists of three percent of the effort in the Pacific.	Agree - the Hawaii-based fleet represents about 2.5 and 4.5 percent of the total longline effort in the Pacific and North Pacific, respectively. This is noted in Section 4.11.3.1.4
P17b	Honolulu - Mr Martin	The scientists I've talked to and work with [as opposed to Mr Achitoff's] don't agree that the Hawaii fishery cannot be part of a long-term solution. The industry here is very much wanting to participate in the solution to the problem, export the solution around the country and around the world, and we feel that we have the best opportunity to do that.	The long-term solution will require a global effort. Information has been added to Chapter 2 to indicate industry's willingness to participate in finding a solution. This has been evidenced at public hearings and in written comments.
P17c	Honolulu - Mr Martin	Speaking for many members of the HLA, we would like to support Alternative 1, no action for the tuna sector of the Hawaii-based longline fishery. Amend the Pelagic FMP to implement Option A, and continue with observer coverages that give the scientific people a higher level of confidence that the information that they're working with is valid and accurate.	Alternative 1 will not provide the required level of protection of turtle stocks. Further, because Option A is not a specific part of the Preferred Alternative, a separate permit to take turtles will be necessary for its implementation. The increased levels of observer coverage will provide improved data for the tuna sector of the fleet, but if Alternative 10 is adopted without Option A, no data on shallow sets will be generated.
P18a	Honolulu - Mr Mareck	I went through ten years of fish tickets and took a look at what April and May mean: between 15-25 percent of our fish every year. They're good months. I, with my other owners, am against the closure.	Information on the importance of fishing in April and May has been added. However, the new Preferred Alternative (Alternative 10) permits year-round fishing outside of the seasonally closed area.
P18b	Honolulu - Mr Mareck	I'm not really sure that the problems are as great as they appear. That little square over there [court-ordered closure areas] I think is 1500 miles on the side. That's something like 3 million square miles. The entire fishery puts out 12 million hooks a year. That's about four hooks per square mile per year. That's insignificant. If the whole fishery totally disappeared tomorrow the turtle and bird populations - the difference would be minuscule.	The significance of bycatch is not directly related to the number of hooks deployed in a potential closure area by the fisheries, but to the actual or potential impact the fishery as a whole has on the various albatross and turtle populations. The precautionary principal requires that, in the absence of data that suggest otherwise, conservative estimates of impact be regarded as the actual or likely level of impacts. Data presented in this document as well as the Pelagics BO demonstrate that the problem is not minor.
P19	Honolulu - Mr Asted	I've looked at the government and Sierra Club surveys online, and the biggest detriment to the turtle stocks is environmentalist and scientists roaming through the nesting areas and stepping on eggs. Who are we really picking on here and why?	The multiple sources of turtle mortality are identified and discussed in the EIS. There is no evidence that conservation activities (e.g. patrolling beaches on foot) on nesting beaches are detrimental to sea turtles.

Tracking No.	Commenter	Comment	Response
P20	Honolulu - Mr Truo	I think the fishing industry should be continued while we make some studies, some tests, to find the solution how to minimize the mitigation of the sea turtles. If you ban the swordfishermen there is no way, no chance, for you to find the solution how to solve the problem.	Fishing industry should be involved in finding solution to bycatch problem with sea turtles. If Option A is implemented, the Hawaii-based longline fishery will be at the forefront of turtle interaction deterrent development. If not, research will be inhibited.
P21a	Honolulu - Mr Myking	I don't agree with NMFS' preferred alternative. There is no justification or scientific basis in the EIS as part of the recommendation on no longline fishing during April and May or any other part of the year.	The new Preferred Alternative (Alternative 10) is anticipated to eliminate a source of relatively frequent longline/turtle interactions. The EIS and the Pelagics BO support the Preferred Alternative.
P21b	Honolulu - Mr Myking	It has already been mutually agreed by all sides in court that completely shutting down the Hawaii longline fishery would not have an effect on saving the leatherback turtle. So why would anyone think that no fishing for two months would have an effect?	Available data indicate a relatively high interaction rate for tuna sets south of Hawaii. This is the reason for the seasonally-closed area in the new Preferred Alternative (Alternative 10).
P21c	Honolulu - Mr Myking	Turtle interactions are very rare when fishing ahi, so why make any change at all to that fishery.	Available data indicate a relatively high interaction rate for tuna sets south of Hawaii. This is the reason for the seasonally-closed area in the new Preferred Alternative (Alternative 10).
P21d	Honolulu - Mr Myking	The reality for fishermen is that with the closure, it will be mid to late June before seeing a paycheck for that June trip - so three months of no income.	The new Preferred Alternative (Alternative 10) includes a seasonally-closed area, but allows year-round tuna-style fishing elsewhere.
P21e	Honolulu - Mr Myking	And June and the summer months are typically slow for us and the price of fish is down.	The new Preferred Alternative (Alternative 10) includes a seasonally-closed area, but allows year-round tuna-style fishing elsewhere.
P21f	Honolulu - Mr Myking	We will lose our local market to foreign imports during these months that we cannot land fish and markets are a difficult thing to gain back.	Information on the potential impacts of increased reliance on imported fish has been added to the EIS.
P21g	Honolulu - Mr Myking	Right when taxes are due and we pay them, we will have nothing to live on as 100 percent of our income comes from fishing.	The new Preferred Alternative (Alternative 10) includes a seasonally-closed area, but allows year-round tuna-style fishing elsewhere.
P21h	Honolulu - Mr Myking	This will force us into the food stamp line or force us to fish the unregulated fisheries, which are already showing signs of strain, and even more turtle interactions may occur.	The new Preferred Alternative (Alternative 10) includes a seasonally-closed area, but allows year-round tuna-style fishing elsewhere.
P21i	Honolulu - Mr Myking	I would support Alternative 1.	Alternative 1 will not provide the required level of protection of turtle stocks. NMFS must meet the legislative mandate under ESA.

Tracking No.	Commenter	Comment	Response
P22a	Guam - Mr Eads	[re shark finning] Domestic fishermen carry the burden. It wouldn't have an environmental impact because foreign fishing vessels would not have to comply with these regulations.	Agree - shark stocks are not currently overfished. NMFS must comply with the new federal statute banning the practice of finning.
P22b	Guam - Mr Eads	It [shark finning? the EIS?] doesn't have much to do with us. We appreciate, you didn't spend too much time on it, because, quite frankly, I don't think American vessels can compete here or in American Samoa, that's why they're not here. The reason they can't compete is because of the legislation that places US domestic vessels in unfair competitive situations.	Economic factors, rather than regulatory provisions, play a more important role in determining the geographic disposition of domestic fishing vessels. In fact, Magnuson-Stevens Act provisions are intended to be non-discriminatory, except for encouraging "sustained participation by fishing communities" and its recognition of indigenous rights. There are no regulatory barriers preventing U.S. domestic vessels from fishing in the EEZ waters anywhere in the Western Pacific Region. Recent amendment of the MSA by Congress to ban finning of sharks without retaining their carcasses applies only to U.S. vessels. Foreign vessels may continue the practice of shark finning.
P22c	Guam - Mr Eads	Transponders on foreign vessels. p3-382 shows distribution of foreign longline catch from 95 to 97 or 98. It looks to me like a few hundred thousand hooks per year in our EEZ. We've had a problem recently with vessels throwing Chinese immigrants off outside the reef. They've been dying. Lately it's been fishing vessels that come by the reef, throw the guys out. Nobody can catch the boats. If a vessel enters our EEZ without a transponder, it's suspect. Put a transponder on, let's get some real data about catches, real data about where people are, what they're doing and how they're doing it.	The illustration depicts longline fishing effort in an area of 5 degrees latitude by longitude. The area illustrated for Guam does not imply that fishing has occurred in the EEZ as the area also represents the northern EEZ of the Federated States of Micronesia where foreign fleets are active. As foreign vessels are not licensed to fish in the Guam EEZ there are no requirements for transponders.
P22d	Guam - Mr Eads	Our FADs our federally funded. We're not allowed to put anything on our FADs. No netting. No unlighted rope. No extra stuff except the bare buoy because we might entangle sea turtles. Every FAD that I've ever found discarded or lost by a purse seiner is covered by hundreds of feet of purse seine webbing.	Neither the Pelagics FMP nor apllicable international agreements include regulations on the construction or deployment of drifting FADs as used in the purse seine fishery.

Tracking No.	Commenter	Comment	Response
P23	Guam - Mr Huira	None of the comments brought up talk about here [Guam]. So, are we going to be considered as part of the US or are we going to be considered as Guam. [earlier discussion about whether Guam counts as a US port in relation to the shark finning ban.]	Alternatives 2, 8, 9 and the new Preferred Alternative (Alternative10) specifically affect fishing in Guam and are analyzed in the EIS. Recent amendment of the Magnuson-Stevens Act by Congress to ban finning of sharks without retaining their carcasses applies to U.S. vessels in areas under U.S. jurisdiction. Guam is a U.S. port.
P24	Guam - Mr Tedfaotao	Sometimes I saw people offloading sharkfin from Western Pacific here, and they're packing here and going to send them to Hong Kong. You said you're going to control shark. What higher authority is looking into those cardboard boxes and find out if it is legal or illegal. Where is the proper authority to find this out.	Agree - the recent amendment of the Magnuson-Stevens Act by Congress to ban finning of sharks without retaining their carcasses applies to U.S. vessels. Foreign vessels on the high seas are not subject to U.S. jurisdiction and are expected to continue the practice of shark finning. Clarifying regulations are scheduled to be published.
P25a	Guam - Mr Duenas	My biggest problem with the commercial fisheries in regards to the Hawaiian experience is that it will affect us [Guam]. Those folks have to go somewhere and they may come here. We might have a gear conflict. It's a reality that their management plan will someday come to Guam, just as bottomfishing will soon come to Guam and CNMI.	Agree - the Pelagics FMP applies to the EEZ around Guam. There are framework measures in the FMP that will allow effort restrictions (e.g., vessel size limits), closed areas or limited entry in a Guam-based longline fishery. There is currently a longline exclusion area around the island to minimize gear conflicts and catch competition between longliners and smaller vessels participating in other fisheries.
P25b	Guam - Mr Duenas	There's the issue of shark finning. I don't understand why another alternative don't identify the boats that are finning and get rid of those boats in Hawaii.	Until the recent ban was enacted, it was not illegal to engage in the practice of shark finning. The proceeds from this activity represented a significant component of crew compensation. Penalties for violation of the new law will be specified in forthcoming regulations.
P25c	Guam - Mr Duenas	As far as Guam is concerned, there are issues regarding foreign boats offloading here, shark fins are being offloaded all the time.	The recent amendment of the Magnuson-Stevens Act by Congress to ban finning of sharks without retaining their carcasses applies to U.S. vessels. Foreign vessels may continue the practice of shark finning. Clarifying regulations are scheduled to be published.

Tracking No.	Commenter	Comment	Response
P25d	Guam - Mr Duenas	The whole issue of attacking the longliners in Hawaii is wrong. If you take all the numbers done by SPC, 20 percent of the world's catch in our area, 20 percent is us trollers, longliners, pole and line guys. You're talking about thousands of boats that catch 20 percent of the fish. So 80 percent is caught by 150 purse seiners and they caught enough last year to feed the world this year. To me, purse seiners should be addressed here. Everyone knows you use large nets to encircle fish you're going to catch everything in that net: sea turtles, birds that dive into the water.	Section 1.4.1 is intended to provide this context, by showing that total region-wide pelagic fishery landings (i.e., including foreign vessels) are much larger than fisheries managed under the Pelagics FMP. However, this EIS addresses issues raised by U.S. domestic pelagic fisheries that are actively managed pursuant to the Pelagics FMP. Purse seiners are considered in the Pelagics FMP (in the context of fishing in Pacific remote island areas) and no specific policies or regulations for regulating purse seiners outside the EEZ stem from the FMP. The purse-seine fishery represents about 60 percent of the pelagic fish caught in the western and central Pacific Ocean (WCPO, Section 3.14.3). Unlike the purse-seine fishery in the eastern Pacific, dolphins are rarely caught in the WCPO and discards in the WCPO fishery amounted to less than 0.5 percent of the total catch volume (Section 3.5).
P25e	Guam - Mr Duenas	I don't think it's right that I, as a U.S. citizen, don't have any more rights versus the guy that is foreign. There's much more advantage for me to go to the Philippines and become a Philippine-flagged vessel and return to Guam and to offload. I could fin.	The exemption of certain U.S. laws for the Territory of Guam is intended as an economic stimulus for Guam.
P25f	Guam - Mr Duenas	With all due respect to the Coast Guard, they cannot enforce the alien interdiction problem, want more boats fishing 50 miles out. We do have a closure area for longline. We do have three longline domestic boats. Who is going to monitor them to stay out 50 miles? No one.	The area closure could be enforced using VMS, but with the USCG's fiscal crisis they are reducing air and surface patrols in the region.
P26a	Guam - Mr Christensen	I just seem to see a continued indifference in the decline in the pelagics out here.	NMFS is very concerned about the status of the stocks of PMUS, NADS and protected species. The EIS and the new Preferred Alternative (Alternative 10) reflect these concerns.
P26b	Guam - Mr Christiansen	My suggestion would be to take the most conservative action possible until the data proves differently or proves what is the best plan to manage our fisheries.	All indicators suggest that no PMUS are overfished.
P27			

Tracking No.	Commenter	Comment	Response
P28	Guam - Mr Smith	My concern is as far as the law enforcement side is concerned. Here we notice [foreign] longliners unloading fish, there's thousands of pounds just being thrown away because they're freezer burned. We would like to have somebody come up to us and give us some federal status of what we can do about it, because I see too much fish being wasted.	Foreign vessels fishing on the high seas are not subject to U.S. regulations. Spoilage of stored product is an economic problem for the owner, and possibly a solid waste disposal problem subject to Guam regulations.
P29	Saipan - Mr Gurley	Basically we're regulating the American Hawaii fishermen and we're doing nothing to address the impacts of foreign-based or California. I don't understand the logic there.	This EIS concerns only those fisheries managed under the Pelagics FMP. Separate laws and regulations apply to other fisheries.
P30a	Kona - Mr McCoy	To decide what alternative we should use the idea of continuing some form of fishing, whether it be through Option A or a more realistic approach such as was offered by Dr. John Hampton (Appendix E).	The new Preferred Alternative (Alternative 10) has a much higher targeted turtle take reduction percentage over any of the time/area closure scenarios favored by Dr. Hampton. Option A, however, would be similar in many respects to his "enhanced monitoring and direct management of turtles" zone.
P30b	Kona - Mr McCoy	Dr. Hampton makes the key point that a lot of this closed area is still going to continue with foreign fishing. I am concerned about the bigger picture, the government and the public thinking no other fishing takes place and everything is hunky dory when we know that's not the case.	The EIS notes that the Hawaii-based fleet represents about 2.5 and 4.5 percent of the total longline effort in the Pacific and North Pacific, respectively. See Section 4.11.3.1.4.
P30c	Kona - Mr McCoy	But if we close all of the U.S. fishing, we're also going to close off any opportunity for data collection. Instead, define a high-take zone that would be subject to enhanced monitoring and then close if off to observed take when it reaches pre-determined levels. Otherwise we're not going to get any data on what's going on [with the foreign fleets that are fishing out there also.]	Option A would function much as you suggest. However, this will not improve our understanding of foreign fleet turtle interactions.
P30d	Kona - Mr McCoy	The U.S. effort at the MHLC is going to flop terribly if the approach of the U.S. is to first stop all fishing and then talk about how we're going to do it. Japanese, Koreans and Taiwanese won't come to the table to even discuss things unless we have some common ground. That common ground is going to have to be continuation in some form of a very large industry in the Central and Western Pacific.	The expressed concern may be valid and highlights the value of Option A.

Tracking No.	Commenter	Comment	Response
P30e	Kona - Mr McCoy	So I think the alternatives which allow some form of fishing, highly observed, 100 percent observers, that takes into account as Dr. Hampton has proposed, is probably the most logical and practical way to proceed. It would give us the opportunity to get where we want to get with incidental take of turtles.	Dr. Hampton's analysis is mindful of fishing effort disruption and consequent economic impacts. Under ESA, however, reduction of turtle takes is of paramount importance, and NMFS must fulfill its legislative mandate under ESA.
P31a	Kona - Mr Gaffney	This should be an ecosystem wide EIS focusing on the broader line of fisheries in the Western Pacific Region. In all the alternatives, I see that this EIS is focused almost solely on the longline fishery. I think this is a mistake, and I think that the Sustainable Fisheries Act, Magnuson-Stevens Act, NEPA all require of an FMP a much broader perspective.	Much of the western Pacific ecosystem lies outside U.S. jurisdiction. This EIS reflects the relative importance of the Hawaii-based longline fishery within the Pelagics FMP-managed fisheries in the Western Pacific Region. The infinite range of alternatives has been narrowed appropriately. In this case, there are no prohibitions that apply to any other specific pelagic fishery in the region, nor are there reporting and recordkeeping requirements, or even requirements for federal permits, for any other specific pelagic fishery. Where specific issues are apparent, such as the potential gear conflict issue in American Samoa, alternatives have been developed.
P31b	Kona - Mr Gaffney	The premise seems to be that the longline fishery is the dominant fishery, and that's an incorrect perception. I think there are a number of studies that would indicate that the recreational sport and charter fishery in the Western Pacific Region is superior in a number of ways. It employs more people, it has a greater economic impact, there's more vessels involved. In everything other that the total value of landed catch, depending on how you analyze the value of landed catch, the recreational fishery is in fact dominant.	No attempt is made in the economic analysis to identify any fishery as a dominant fishery. Information reported for the various fisheries may identify where each fishery ranks in comparison to the other fisheries for certain measures, but an overall dominance ranking is not attempted or provided.
P31c	Kona - Mr Gaffney	There are many, many, many errors when it comes to discussion of recreational fisheries in the region. There is, for instance the statement that there is no direct fishery for spearfish in the region. There is a very focused fishery on that species here in Kona. Literally people come from all over the world for that specific species, and they're successful in getting it here when they can't get it other places.	The text has been modified to recognize the emerging interest in spearfish as a sportfish in Hawaii.

Tracking No.	Commenter	Comment	Response
P31d	Kona - Mr Gaffney	That's typical I think for the kinds of short-sightedness or lack of research that's gone on. Of course, we all know that the database that's available to NMFS, to West Pac, with regard to recreational sport and charter fishing is extremely poor and that's the result of basically 25 years of neglect of that fishery.	The lack of data on recreational catch, effort and protected species interactions, is a significant impediment to our understanding of the effects of fisheries on the pelagic ecosystem in the western Pacific. Several programs are being designed and implemented to address this deficiency. In Hawaii, the Marine Recreational Fisheries Survey has recently begun again, after a gap of 20 years. This program includes a telephone survey, an angler intercept survey and a charter boat intercept survey.
P32a	Hilo - Mr Gilmartin	I find myself agreeing with the preferred alternative in the Pelagics. I think it is a good measure and a conservative way to manage these species.	In response to new information, comments and analyses, including the Pelagics BO, a new Preferred Alternative has been developed.
P32b	Hilo - Mr Gilmartin	I am opposed however to the inclusion of Option A because it would likely increase the take of turtles and from what I understand the low level of turtle takes would have to be done for an extremely long period of time in order to get the numbers to suggest a particular methodology may be a little bit better at saving turtles than another.	Option A is not a part of the Preferred Alternative. It would, however, offer the potential or solutions that could be exported internationally with significant positive impacts on world-wide turtle stocks.
P32c	Hilo - Mr Gilmartin	I would also suggest that the fishery continue at what is the current observer coverage, which I think is about 20 percent on the tuna fishery and 100 percent on the swordfish fishery.	The new Preferred Alternative (Alternative 10) specifies 20% observer coverage in the tuna fishery. If Option A is implemented as proposed, there will be 100% observer coverage of these shallow sets.
P33a	Hilo - Ms Tummons	There should be some minimum number of percentage of observer coverage established in the alternatives. Without some minimum level of observer coverage established in this document, I think we could see a return to this de minimis type of coverage that you had for many years, basically from '94 to '98 or '99 when this lawsuit was brought. A level of 20% for the tuna vessels seems reasonable.	The new Preferred Alternative (Alternative 10) specifies 20% observer coverage in the tuna fishery. If Option A is implemented as proposed, there will be 100% observer coverage of these shallow sets.
P33b	Hilo - Ms Tummons	You have one set of observers that is going to be required for the turtle interactions and in your rules for seabird interactions it seems you have put in place another set of observers, why not combine the two observers and have just one observer who is able to report the incidence of bycatch for the turtles and the seabirds.	NMFS' plans call for only one set of observers.

Tracking No.	Commenter	Comment	Response
P89	Lanai - Willie Orboro	Related story of one leatherback that nested there years back but eggs were watched and never hatched.	Comment is an observation. No response required.
P107a	Lanai - George Purdy	Everything around Lanai is "all fished out" as everyone comes there to go fishing, particularly on the calmer side. He used to be an onaga fisherman, but now onaga is small where it used to be 50lbs or more. He has other jobs for money now as you can't catch enough to sell for a living.	Territorial seas are not included under the Pelagics FMP.
P107b	Lanai - George Purdy	There are maybe 3 or 4 local boats that supply fresh fish sufficient to supply the resorts on the island. There are some charter and recreational boats that fish.	Comment is an observation. No response required.
P107c	Lanai - George Purdy	His idea for turtles and some of the target species is to breed them and let them loose. Do some studies and figure out how to raise them and release them. After all, if they can do green mice at the university, why not some protected and target species?	While it may be possible to develop techniques for the protection and hatching of turtle eggs, closure of the life cycle of a sea turtle species in captivity would be an even more difficult scientific undertaking, given the current paucity of information on turtle life cycles and migratory patterns.

APPENDIX S

Public Comments on the Draft Environmental Impact Statement on the Pelagic Fisheries of the Western Pacific Region: Summarized Transcription of Written Testimony Submitted to National Marine Fisheries Service, Pacific Island Area Office, During the Official Public Comment Period of December 15, 2000 to January 29, 2001, with Responses.

WRITTEN PUBLIC COMMENTS

Tracking No.	Commenter	Comment	Response
P34	written - Mssrs. Mareck, Thompson, Aasted, Narrone	We are adamantly opposed to our fishing being stopped for the months of April and May. Those months account for 18-27 percent of our annual production [based on fish records for ten years].	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to Section 3.10.2.3. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the DEIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the EIS.
P35a	written - Gary Ishimoto	I purchase fish for a wholesale fish company that depends heavily on the Hawaii longline fishery for fresh pelagic fish at all times but especially during these two months, which include the Lenten period of high consumer demand.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to Section 3.10.3.1. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the DEIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the EIS.
P35b	written - Gary Ishimoto	To offset the large reduction in domestic fish supply, my company will have to import tuna and other pelagic fish species during the closure.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to Section 3.10.3.1. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the DEIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the EIS.
P35c	written - Gary Ishimoto	Section 4.11 of the DEIS indicates that many of the countries from which substitute products may be imported have fisheries with higher incidental catches of sea turtles than the Hawaii longline fishery. Your preferred alternative (and other alternatives that would stimulate more pelagic fish imports) has a good chance of increasing the net sea turtle mortality, rather than decreasing it.	"Exportation" of impacts along with demand is a possibility discussed in Section 4.11. In the case of swordfish, the demand would arise from areas outside of Hawaii, as the bulk of swordfish landed in Hawaii is exported. The preferred alternative permits tuna fishing year-round, although with an area to the South of Hawaii closed for two months.

Tracking No.	Commenter	Comment	Response
P35d	written - Gary Ishimoto	The closure during the months of April and May will ultimately hurt Hawaii's longline fishing industry, its support industries, and thousands of people that work in this industry.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to Section 3.10.3.1. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P36a	written - Garret Kitazaki	I purchase fish for a wholesale fish company that depends heavily on the Hawaii longline fishery for fresh pelagic fish at all times but especially during these two months, which include the Lenten period of high consumer demand.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to Section 3.10.3.1. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P36b	written - Garret Kitazaki	To offset the large reduction in domestic fish supply, my company will have to import tuna and other pelagic fish species during the closure.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to Section 3.10.3.1. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P36c	written - Garret Kitazaki	Section 4.11 of the DEIS indicates that many of the countries from which substitute products may be imported have fisheries with higher incidental catches of sea turtles than the Hawaii longline fishery. Your preferred alternative (and other alternatives that would stimulate more pelagic fish imports) has a good chance of increasing the net sea turtle mortality, rather than decreasing it.	"Exportation" of impacts along with demand is a possibility discussed in Section 4.11. In the case of swordfish, the demand would arise from areas outside of Hawaii, as the bulk of swordfish landed in Hawaii is exported. The preferred alternative permits tuna fishing year-round, although with a large area to the South of Hawaii closed for two months.
P36d	written - Garret Kitazaki	The closure during the months of April and May will ultimately hurt HI's longline fishing industry, its support industries, and thousands of people taht work in this industry.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to Section 3.10.3.1. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.

Tracking No.	Commenter	Comment	Response
P37a	written - Van Simpson	I am against the proposed closure of the fishing grounds, I feel it would cause a greater economic hardship than a benefit.	Comment is an opinion. No response required.
P37b	written - Van Simpson	We occupy a small part of total tonnage as opposed to the total tonnage taken by all fishing vessels in the proposed areas. It is unfair to select such a small percentage of fishermen and apply such stringent measures without any real proof that these actions would have any significant effects on the turtle population.	Even if the Hawaii longline fishery is responsible for only a small portion of the total turtle mortality, NMFS must meet the legislative mandate under ESA. Fishers from other U.S. areas and foreign countries may indirectly benefit. Potential effects, including possible adverse effects to turtles, are identified and discussed.
P37c	written - Van Simpson	It is better through training and modifications of fishing techniques, to reduce the number of interactions.	NMFS is working to develop experiments that may lead to new longline fishing strategies or gear modifications for reducing sea turtle/longline gear interaction rates throughout the Pacific Ocean.
P37d	written - Van Simpson	Though a seasonal closure would not kill the fishing industry, it would cause unnecessary hardships.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to the EIS. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P37e	written - Van Simpson	This proposal would affect more than those who would actually catch the fish. The proposal will affect vendors, mechanics, electricians, electronic specialists, and others, therefore, resulting in hardships and relying on compensation and welfare to meet basic living standards.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added to the EIS. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P38a	written - Glenn Tanoue	We are very concerned that NMFS is suggesting a two month closure of our longline fishery. In the months of April and May 2000 we bought and sold approx. $2.5 million worth of fresh seafood from the local auction and 90 percent were from longline products. The loss of sales and revenues will be very severe and I foresee a significant amount of jobs lost because of the closure.	To better describe the economic effects of seasonal closures, a figure showing average monthly landings of tuna, PMUS, and bottomfish from 1979 through 1999 has been added. In addition, changes were made in 4.8.8 to reflect seasonal closure market issues. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in this Final EIS.

Tracking No.	Commenter	Comment	Response
P38b	written - Glenn Tanoue	I request that there be no closure and that NMFS and our fishermen work together to find alternative methods to set their lines that will result in fewer interaction with the turtles.	NMFS has considered this comment and all available scientific information and revised the preferred alternative in the Final EIS. The new preferred alternative will close the directed swordfish longline fishery and implement a two-month (April and May) area closure for the tuna fishery. The area closure will prohibit all longline fishing south of 16° N lat., north of the equator (0°lat.), between 145° W long. and 180° long., however, tuna longline fishing will be allowed throughout the year outside of the closed area. In addition, NMFS is working to develop experiments that may lead to new longline fishing strategies or gear modifications for reducing sea turtle/longline gear interaction rates throughout the Pacific Ocean.
P38c	written - Glenn Tanoue	Currently there is very little interactions between the tuna longliners and turtles.	Even if the Hawaii longline fishery is responsible for only a small portion of the total turtle mortality, NMFS must meet the legislative mandate under ESA. Fishers from other U.S. areas and foreign countries may indirectly benefit. Potential effects, including possible adverse effects to turtles, are identified and discussed.
P38d	written - Glenn Tanoue	I suggest that EarthJustice and the fishing industry work together in partnership by creating a fund to breed and raise turtles to be released into the ocean. To fund this program, for every pound of longlined fish, a tax would be assessed. EarthJustice would match our total contribution so that a perpetual fund can be created.	NMFS is investigating all possible measures to help increase sea turtle populations and mitigate the population-level impacts of sea turtle mortality from longline gear interactions.
P39	Written - Steven Krown	I strongly urge you to stop longliners in Hawaii and American Samoa. The practice of incidental catch must be stopped to prevent the brutal destruction of sharks, sea turtles, sea birds, and low priced fish.	The preferred alternative, in conjunction with the STAL BO, the legislative ban on shark finning and the RPMs from the Pelagics BO will minimize bycatch and mortality of sharks, turtles and seabirds. At this time it is not possible to completely eliminate bycatch of non-target fish species in longline fisheries.
P40	written - Nancy Do	Banning longline fishing will put my family on the street. Fishing has been our source of income for over twenty years. The number one reason why we fish, is because we have to pay our bills. If you could think of a way to negotiate with the fishing industry, it would help everyone.	The EIS describes and analyzes the economic impacts of the various alternatives, as well as protected species considerations.
P41	written - Stacy Aly	I feel that banning longline fishing is an act that will cause more harm than good. By implementing this ban we will be forced to buy our fish from mainland suppliers at higher prices. Many fishermen will be out of employment unable to support their families and being a drag on our economy.	Additional information on the social and economic impacts have been made to reflect the impact of seasonal closure on market, supply, and alternative activity issues.

Tracking No.	Commenter	Comment	Response
P42	written - Joy Mitchell	I feel here in the islands there is a need for commercial fishermen. It is one of the most natural resources here in the islands. I feel that it should not be banned but that we should find a compromise for these longline fishermen. This is their means of supporting family needs and selves. Don't take this away from them.	Comment is an opinion. No response required.
P43	written - Rose Bau??h	Many HI residents make a living by fishing. Their only source of income is catching fish and selling them to local vendors. Banning fishing will make families struggle even more if they should ban them.	Additional information on the social and economic impacts of job loss and reduced income have been added.
P44	written - Cathy Sum Sung	I as an Islander feel we should never ban the longline fishery. We have the best tasting fishery; it is the most natural, no chemicals. These are hardworking people and this is their livelihood.	Comment is an opinion. No response required.
P45	written - Carrie Suru Freith	Here in the islands the need for longline fishing is something that can't be taken away. I believe first and foremost it needs not to be banned but a compromise should be instated. If fishing is banned for good we would have no choice but turn to the mainland for our fish then causing our prices to shoot up rapidly.	Comment is an opinion. No response required.
P46	written - Laura Kalubu	Re commercial longline fishing issue, we still need to keep the fishermen working. It is their livelihood and generates income of the industry as well as creating food for the people of Hawaii.	The new Preferred Alternative (Alternative 10) keeps the majority of longline fishers working year-round. Those fishers now targeting swordfish using shallow sets, however, must change fishing methods or leave the fishery. If Option A is implemented, some of the swordfish fishers may be able to fish under the Fishing Experiment.
P47	written - ??	I feel bad when the fishing industry in Hawaii is being banned because that's the only means of livelihood of people in Hawaii.	Comment is an opinion. No response required.
P48	written - Elena Takaki	Support the objectives listed for Preferred Alternative 7.	Comment expresses a preference for an alternative. No response required.
P49	written - Jonathan Wallace	Support for Preferred Alternative 7. An experimental fishery can not be justified in the Hawaiian fishery. The rate of turtle capture necessary to obtain statistically significant results would be unacceptably high considering the critically endangered status of these turtles.	The description of Option A in the Final EIS has been expanded to provide details necessary to generate statistically reliable conclusions.
P50	written - David Pittman	Suggest Alternative 7, without any experimental fisheries involvement. Longline fishing strictly prohibited.	Comment expresses a preference for an alternative. We assume the desired prohibition of longlining refers to shallow swordfish sets.

Tracking No.	Commenter	Comment	Response
P51	written - Peter Webster	Prefers Alternative 1 and Option A. From my experience the tuna fleet has a minimal interaction with turtles and other endangered species. I feel our fishing would provide important data for species in question.	Alternative 1 will not provide the required level of protection of turtle stocks. Further, because Option A is not a specific part of the preferred alternative, a separate permit to take turtles will be necessary for its implementation. The increased levels of observer coverage will provide improved data for the tuna sector of the fleet, but if the new Preferred Alterantive (Alternative 10) is adopted without Option A, no data on shallow sets will be generated.
P52	written - Julie Bickley + 7	Support for Alternative 8. No experimental fishery. Only a complete ban of longline will protect the turtles.	Comment states a preference for an alternative. No response required.
P53	written - Karin Baumgartner	Do everything possible to end this abhorrent practice [longline fishing].	Assume this comment reflects a preference for an alternative. No response required.
P54	written - Geoff Sweeney	Do everything in your power to limit and/or terminate the longline method of fishing. It is an ecological diaster and a moral outrage.	Assume this comment reflects a preference for an alternative. No response required.
P55	written - Samntha Freeland	Support Alternative 7 and oppose the plan for experimental fishing. On behalf of Earth Club at USC.	A new Preferred Alternative has been developed as a result of new information, comments and analyses, including the Pelagics BO. Option A is not part of the Preferred Alterantive, but may be pursued under an ESA Section 10 permit.
P56	written - Cecilie Davidson	Please do everything in your power to adopt only policies that reduce all species of turtle takes to the lowest possible levels. For Intl Year of the Tiger Foundation.	Assume this comment reflects a preference. No response required.
P57	written - Sharon Hurd	For Air Cargo Association of Hawaii Board of Directors We support HLA's request to stop NMFS from seasonal closures of all longline fishing areas because it would negatively impact the fishing industry in Hawaii and closures would do little to help the pacific wide turtle populations [as other nations will fish in the areas that are off-limits to Hawaii fishermen.]	Even if the Hawaii longline fishery is responsible for only a small portion of the total turtle mortality, NMFS must meet the legislative mandate under ESA. Fishers from other U.S. areas and foreign countries may indirectly benefit. Potential effects, including possible adverse effects to turtles, are identified and discussed.
P58	written - Sabina Ludwig	I strongly urge NMFS to halt this wasteful practice [longline fishing]. Limiting longliners for only two months is not enough. The unconscientious brutal destruction of sharks, sea turtles, dolphins, seabirds, etc. must be stopped.	Assume this comment reflects a preference for an alternative. No response required.
P59	written - David Dewenter	Pacific leatherback are endangered and each member of the species is significant and needed for reproduction and survival. Alt 7 would provide the greatest safety for the different sea turtle species while providing for the continuation of the longline fishery and should be the course of action.	Comment states a preference for an alternative. No response required.

Tracking No.	Commenter	Comment	Response
P60a	written - Bonnie Bator	Stop the longline industry until such time that a baseline data of fish count be undertaken.	All indicators currently show that most PMUS stocks are stable, none are overfished.
P60b	written - Bonnie Bator	Also, the sustainability of target species needs to be established.	All indicators currently show that most PMUS stocks are stable, none are overfished.
P60c	written - Bonnie Bator	Moreover, if the longline industry is reinstated to fish in the WPR, honest oversight upon each and every ship needs to be mandated.	The new Preferred Alternative (Alternative 10) specifies 20 percent observer coverage in the tuna fishery. If Option A is implemented as proposed, there will be 100 percent observer coverage of these shallow sets.
P60d	written - Bonnie Bator	Lastly, the practice of incidental catch [of sharks, sea turtles, sea birds, monk seals and low-priced fish] must be outlawed. The penalty should be immediate surrender of ships and related asset foreclosure.	The new Preferred Alternative (Alternative 10) in conjunction with the STAL BO, the legislative ban on shark finning and the RPMs from the Pelagics BO will minimize bycatch and mortality of sharks, turtles and seabirds.
P61	written - Joey Fink	I fully support Alternative 8, complete ban of longline fishing in US waters and the banning of landings from vessels using longline gear.Preferred Alternative 7 not enough, experimental fishery should not be allowed.	Comment states a preference for an alternative. No response required.
P62a	written - Ward Graessle	Protest to the preferred alternative. I feel it is overly harsh.	Comment states an opinion. No response required.
P62b	written - Ward Graessle	It would seem that increasing coverage of the observer program would be a better alternative.	NMFS is considering and analyzing methods of collecting information on sea turtle mortality that results from all the various types of pelagic fishing methods utilized in the Pacific Ocean by both domestic and foreign fishers. NMFS agrees that adequate observer coverage is needed to collect statistically reliable information on fishery bycatch. The new Preferred Alternative (Alternative 10) requires at least 20 percent observer coverage in the Hawaii-based longline tuna sector. However, it is important to note that the presence of observers onboard fishing vessels, or increasing the level of observer coverage, does not reduce the level of sea turtle take by longline fisheries.
P62c	written - Ward Graessle	I would like to see NMFS make their decision based not on the demands of the vocal minority but on the best science and data available and what the scientists say sustainable.	The sustainability of the turtle population is at the heart of this matter. It is NMFS's responsibility to carry out its mandate under the ESA. The new Preferred Alternative (Alternative 10) represents a precautionary approach, given the paucity of good data on turtle interactions, post-hooking mortality and other key parameters.
P63	written - Sarah Bajarin	Urge Alternative 8, complete abolishment of longline is essential to protect the endangered species.	Comment states a preference for an alternative. No response required.

Tracking No.	Commenter	Comment	Response
P64a	written - Rebecca Do	By banning the longline industry a lot of people will lose their jobs and be forced to go on welfare. The longlining industry is the main source of income for my family.	The EIS describes and analyzes possible alternate uses of vessels and the fact that some current participants in the fishery may leave.
P64b	written - Rebecca Do	Many of the workers are not good at English and that will give them a hard time finding work outside the industry.	Agree - no response required.
P65	written - Julie Do	I understand we have to protect our endangered species but the public has to understand that fishing is my father's life and the only way he can promise his children a bright future. Banning fishing for a few months or limiting a vast area of the ocean from longliners is not a compromise.	The EIS attempts to describe the economic impacts of the various alternatives. However, management measures must address protection of endangered species under the ESA.
P66	written - Jimmy Do	Fishing in the longline fishing industry is how my father gets the money to pay bills for house, boat, food and college.	The EIS attempts to describe the economic impacts of the various alternatives. However, management measures must address protection of endangered species under the ESA.
P67a	written - Peter Craig	DEIS purports to provide a "comprehensive examination" yet it does not address the bycatch of a key ES in American Samoa, the hawksbill sea turtle. Hawksbills are in serious trouble in our region. The recent NMFS/FWS Recovery Plan (1998) states that "in the Pacific this species is rapidly approaching extinction" and that they have become "seriously depleted" in the Paciific.	From 1992-1999, the take of sea turtles in the American Samoa longline fishery included at least four hard-shelled sea turtles (three released alive, and one mortality), one leatherback and one unidentified turtle. These figures are from federal logbooks; there is no observer coverage in this fishery. The new Preferred Alternative (Alternative 10) includes a provision for observers throughout the Western Pacific Region where feasible.
P67b	written - Peter Craig	Although the Recovery Plan does not specifically list fisheries bycatch as a main threat to hawksbills in American Samoa, its text [written in ~1994] predates the rapid expansion of American Samoa's new longline 'alia' fishery (which began about 1996.) This fishery indeed has a turtle bycatch according to logbooks.	From 1992-1999, the take of sea turtles in the American Samoa longline fishery included at least four hard-shelled sea turtles (three released alive, and one mortality), one leatherback and one unidentified turtle. These figures are from federal logbooks; there is no observer coverage in this fishery. The new Preferred Alternative (Alternative 10) includes a provision for observers throughout the Western Pacific Region where feasible.
P67c	written - Peter Craig	There is a need for an American Samoa-specific FMP that addresses local turtle bycatch issues, and a need for obsevers to quantify turtle interactions.	The Regional Council process and the existing Pelagics FMP include sufficient ambit to accommodate area-specific management issues and needs.
P68a	written - Theresa Menard	P3-103a says there are no reports of interaction between hawksbills and Hawaii-longline. This statement is not in agreement with Skillman and Kleiber 1998 who reported "3 turtles were logged as hawksbill turtles in 1995" and 4 in 1996. In the interest of clarity, please add a few sentences to the DEIS to let the reader know why this was not discussed in the DEIS.	NMFS does not rely on logbook data for protected species data interactions because of the unreliability of species identifications. NMFS observers have never seen a hawksbill interaction in this fishery.

Tracking No.	Commenter	Comment	Response
P68b	written - Theresa Menard	The criteria for evaluating a vessel operator's opinion should be stated in the DEIS (or cited somewhere). Some criteria may be more valid than others. For instances the lack of a 'hawksbill' on an adult might be a good reason to disagree with the vessel operator's determination. Whereas the finding of a juvenile hawksbill outside its known range might not be an appropriate reason given we know so little about the foraging behavior of hawksbills in the Pacific.	NMFS does not rely on logbook data for protected species data interactions because of the unreliability of species identifications. NMFS observers have never seen a hawksbill interaction in this fishery.
P68c	written - Theresa Menard	If Skillman and Kleiber used correct numbers, then the allowable take of hawksbills (2 per year as established in the 1994 BO) was exceeded in 1995 and 1996. Given the "underreporting of turtle takes" in the logbook data (S&K 1998) it seems likely the take was even higher. Because hawksbill turtles are critically endangered and the statistical models to derive take estimates are of questionable accuracy, whenever the number of turtles logged by vessel operators exceeds the allowable amount, the logbook data should override the modeled estimates.	NMFS does not rely on logbook data for protected species data interactions because of the unreliability of species identifications. NMFS observers have never seen a hawksbill interaction in this fishery.
P69a	written - Capt Steve Gates	I am deeply concerned about Alternative 7. This alternative will make it economically impossible to operate a viable longline fishery from Honolulu. For the past three years 23-37 percent of my yearly gross has been taken in April and May. Loss of this revenue would not allow me to sustain my operation during the slower and less profitable summer months, and the rest of the year barely covers itself. With the recent increases in other operating cost, especially fuel which has increased almost 75 percent in the last year, any loss of fishing effort would force me to relocate or quit and the latter is not an option.	Changes were made in 4.8.8 to reflect seasonal closure market issues. New cost information was not added to the vessel cost model due to lack of available information. Also, fuel price increases may, or may not, be long term relative to fish prices.
P69b	written - Steve Gates	Also any benefit to the turtle stocks would be offset by increased foreign activity especially in the areas directly adjacent to the U.S. EEZ around Johnston Island and Palmyra Atoll. The presence of the domestic longline fleet generally keeps the foreign vessels farther south to avoid gear conflicts.	Cumulative impact analyses (Sections 4.11.7, 4.11.9) point out the possibility that fishing effort will relocate from Hawaii to unmonitored and poorly regulated fisheries outside the Pelagics FMP management area, and assess the potential adverse impacts for turtle populations.
P69c	written - Steve Gates	The displacement of any of the domestic fleet could also have a negative effect. If I were forced to relocate to Central or South America my area of operation and target species would greatly increase my likelihood of interactions with endangered sea turtles and could potentially have negative impact on less stable fish stocks.	Cumulative impact analyses (Sections 4.11.7, 4.11.9) point out the possibility that fishing effort will relocate from Hawaii to unmonitored and poorly regulated fisheries outside the Pelagics FMP management area, and assess the potential adverse impacts for turtle populations.

Tracking No.	Commenter	Comment	Response
P69d	written - Steve Gates	Any time closure would also have a long term negative effect on the overall marketing of fresh Hawaii fish as seafood buyers are dependent on a steady product supply to remain competitive. When forced to locate new sources for this steady supply of a fresh product, they are often reluctant to return to the old sources if the steady supply is going to continue to be a problem. When Hawaii fish is again available, the buyers would use the foreign import availability as leverage to hold the domestic price down even though the domestic product is of much higher quality.	Changes were made in 4.8.8 to reflect seasonal closure market issues. We have no evidence that higher quality local fish prices would suffer due to market pressure from imported fish that is different than those pressures in the present time. The text acknowledges that there will be changes to the imports and exports of fish and that for tuna and swordfish it is an international marketplace. Information on the increased reliance on imported fish has been added. However, the new Preferred Alternative (Alternative 10) allows tuna-style fishing year-round subject to time/area closures.
P69e	written - Steve Gates	The lower quality product would tarnish Hawaii's reputation for some fo the finest quality product available, as imports would likely be marketed as Hawaii fish.	Information on tuna quality emphasis in Hawaii pelagic fish marketing and the difficulty of substituting lower quality imports for domestic product has been added to Chapter 4.
P69f	written - Steve Gates	There are some major issues with saving endangered turtle populations that need to be addressed other than interactions with the longline fleet. The loss of nesting habitat, coastal pollution, the Chilean Gilnet fishery, the harvesting of turtle meat and eggs that still continues, just to name a few.	These issues have been addressed in the EIS.
P69g	written - Steve Gates	Please consider an alternative that continues to allow what is a very clean fishery by commercial standards to operate while at the same time working to develop new mitigation methods and continuing the collection of accurate data for assessing stock and migratory information. I believe the preferred alternative is Alternative 1.	NMFS has considered the range of alternatives in the Draft EIS, as well as the best available scientific information, in determining the preferred alternative in the Final EIS. NMFS is investigating all possible measures to help increase sea turtle populations, to mitigate the population-level impacts of sea turtle mortality from longline gear interactions, and to collect data on sea turtle mortality that results from all the various types of pelagic fishing methods utilized in the Pacific Ocean by both domestic and foreign fishers.
P70a	written - Glynn Ross	I am in opposition to any closure of the longline fishing industry in Hawaii. To close an industry for two months which would cause a lag time of an additional two-four weeks, would be devastating to the seafood industry.	Comment states an opinion. No response required.
P70b	written - Glynn Ross	One of the seafood industry's largest most profitable times in the year is during the Easter - Lent season.	A figure has been added to Chapte r 3 showing monthly landing trends. Changes were made in 4.8.8 to reflect seasonal closure market issues. The new Preferred Alternative (Alternative 10) minimizes tuna-style closure.

Tracking No.	Commenter	Comment	Response
P70c	written - Glynn Ross	There are no regulations or at least no enforcement of any reasonable standards dealing with sound environmental practices, let alone those dealing with the care or concern of the mortality rate of the sea turtle in many of these third world countries and yet closing the Hawaii fishing industry for a period of time will no doubt force the substitution of imported products from areas which will in turn increase sea turtle mortality many times over compared to that of the Hawaii fishing industry.	Cumulative impact analyses (Sections 4.11.7, 4.11.9) point out the possibility that fishing effort will relocate from Hawaii to unmonitored and poorly regulated fisheries outside the Pelagics FMP management area with potential adverse effects for turtle populations.
P71a	written - James Anderson	I strongly endorse Alternative 9, that the Council define and evaluate the costs and benefits to alternatives to limit entry or effort of longline fishing within the limits of the American Samoa EEZ, and to draft an FMP for that purpose. The longline fishery in American Samoa is in its infant stages of development and as such we need our fishery to be protected from outside forces that could easily remove these resources from under our noses in vast quantities and funnel the profits to outside bank accounts.	Comment states an opinion or a preference. No response required.
P71b	written - James Anderson	I endorse Alternative 5 as a reasonable course of action to limit interactions between the Hawaii-basedbased ll fishery and endangered species. Alternatives 1 and 2 are not considered since they are less restrictive than Alternative 5. Alternatives 3,4,6,7,8 are unacceptable as they exclude certain areas to longline fishing. Such an exclusion is detrimental as by closing these areas to the Hawaii fleet merely opens them to foreign fleets who at the present time avoid those areas due to gear conflicts with their U.S. counterparts.	Alternative 5 is the same as Alternative 7 but without a seasonal closure of the Hawaii tuna longline sector. Comment states an opinion or a preference. No further response required.
P71c	written - james Anderson	Additionally, it is stated on p2-23 that a nearly negligible effect on the mortality rates of endangered sea turtles will result from even the most extreme restriction placed upon the HI longline fishery alone. Expert testimony in CMC v NMFS further supports this statement.	Even if the Hawaii-based longline fishery is responsible for only a small portion of the total turtle mortaility, NMFS must meet the legislative mandate under ESA.
P71d	written - James Anderson	Furthermore, American Samoa longline fishing could be adversely affected by an inundation of boats seeking refuge from the regulations that would be imposed upon them in Hawaii.	Large vessel area closures around American Samoa are proposed as part of Alternatives 2-7 and Preferred Alterantive 10 as a precautionary measure. Alternative 9 would evaluate the need for limited entry in American Samoa longline fishery. The potential of displaced vessels shifting to American Samoa is discussed in Section 4.9.

Tracking No.	Commenter	Comment	Response
P71e	written - James Anderson	I strongly suggest that whatever alternative is applied to Hawaii longline fishing is not necessarily applied to the American Samoa FMP, particularly regarding the deeper setting of gear. American Samoa alia fishermen do not and cannot install line shooters or similar equipment due to boat design.	The Preferred Alternative provides restrictions on the use of shallow-set gear north of the equator.
P72a	written - Chris Evans	Need to develop a territory-specific FMP for the pelagic fisheries resources of American Samoa. American Samoa's longline fishery for albacore is quite different in nature to that of Hawaii. It differs significantly in vessel type/size, line-length, hook set depth and in that there is a high participation rate by local, traditional fishermen. A separate FMP for American Samoa developed in close consultation with the traditional fishermen to fit seamlessly with the existing regional FMP would undoubtedly provide an instrument that would increase the local effectiveness of commercial fisheries management. Alternative 9 provides for the large vessel area 50 nm closure plus control date for limited entry in American Samoa. It also provides for implementation of a comprehensive research plan that will enable catch interactions to be more thoroughly evaluated and appropriate management action to be taken. I would urge the adoption of this management option. A proposal for a comprehensive oceanic fisheries research program for American Samoa has been developed by DMWR and already submitted to PIAO.	The Regional Council process and the existing Pelagics FMP include sufficient ambit to accommodate area-specific management issues and needs.
P72b	written - Chris Evans	Need for establishment of local fisheries management structure. The present vehicle for small-scale commercial fishermen in AS (the *alia* fishing operators) to put forward their concerns over fisheries management issues to the Council moves with insufficient communication and participation, and consequently lacks speed and power to effectively contribute to local Territorial commercial fisheries management. Establishment of a Small-Scale Commercial Tuna Fisheries Management Committee well represented by, and staffed chiefly by, local commercial *alia* fishermen and boat owners, is needed to rectify this situation. There is a valuable lesson to be learned from the precedent of Independent Samoa, which in recent years established a Commercial Fisheries Management Advisory Committee and set a limit on the number of tuna boat operators at 185.	The Regional Council process and the existing Pelagics FMP include sufficient ambit to accommodate area-specific management issues and needs.

Tracking No.	Commenter	Comment	Response
P72c	written - Chris Evans	At the meeting between Paul Bartram and the *alia* fishing operators in American Samoa held on 29th Sep 2000 the fishing operators confirmed their desire to establish a 50 nm zone around the islands of American Samoa and to establish the limited entry program for the pelagic fishery 50-200 nm offshore of the islands. They also expressed a desire to increase the 50' minimum vessel length to 60' to accommodate the larger existing vessels in the domestic fishery. They said that there is a need to move fast on this so as to protect the resource and traditional fishing rights from increased resource exploitation that may result from the displacement of longline fishing vessels from Hawaii's pelagic fishery and the attractions of vessels from Hawaii and mainland north America to this fishery. Paul Bartram reinforced the urgency in his fax to me of 7th Dec and the desire to have draft regulations for discussion sometime in 2001.	The Regional Council process and the existing Pelagics FMP include sufficient ambit to accommodate area-specific management issues and needs.
P72d	written - Chris Evans	At the [above-mentioned] meeting the fishing operators expressed a desire to apply to the WPRFMC to establish a 50 nm zone around banks as well as islands. There is data available on the aggregation effects of seamounts, in the scientific literature relating to the Hawaii pelagic fishery. There is also a most relevant precedent as the Territory of Guam has a small boat zone around both islands and banks. A GIS exercise, to explore how much additional area might be closed if the proposed 50 nm closure were extended to seamounts as well as islands in the American Samoa EEZ, indicated that not much more area would be added. However, protection of several additional, and valuable offshore banks outside of the proposed island 50nm zone would be enhanced by a banks closure. We would also point out that it is not so much the area that is important but conservation of the oceanic (pelagic and bottomfish) resources and the maintenance of traditional rights to fish them. There remains a strong desire amongst the fishing operators - resources users and owners for a 50nm zone around the banks as well as the islands, as a modular attachment to the Council's Pelagic FMP, or a provision of a Council FMP specifically developed for American Samoa.	The Regional Council process and the existing Pelagics FMP include sufficient ambit to accommodate area-specific management issues and needs.

Tracking No.	Commenter	Comment	Response
P72e	written - Chris Evans	There appears to be a need to cap fishing effort in the domestic, near-shore pelagic fishery, 0-50nm from shore, by limitation of the number of licenses at a level appropriate to the best economic return for effort, despite the probability that the fishery is still in the developing phase: 1. Catch rates of albacore tuna have declined in recent years in both Independent Samoa (Samoa Fisheries Division Reports, Mike King) and American Samoa (for 1996-99, demonstrative Figure) - this may be due to inter-annual climate variability or to local depletion or to both. 2. License limitation of the *alia* pelagic fishery in Independent Samoa to 185 vessels has recently been developed by Samoa's Commercial Fisheries Management Advisory Committee. 3. There has been a move towards open access of the *alia* fleets in Samoa and American Samoa within the proposed 50 nm zones ("2 Samoas" talks). 4. Larger domestic tuna vessels (super-*alias*) are currently being test by the Government of Samoa, with the assistance of the SPC.	The Regional Council process and the existing Pelagics FMP include sufficient ambit to accommodate area-specific management issues and needs.
P72f	written - Chris Evans	Concerns over measures proposed in the DEIS to limit bycatch of turtles. Hook set depth in the American Samoa *alia* longline fishery is currently 1-5 fathoms (based on a sample of 6 *alias*, January 2001). This may well be a depth that involves interaction with turtles. Information from fishermen's log books has suggested interactions with turtles and further data analysis is being undertaken by NOAA. A problem is that line shooters (or similar equipment) to set hooks deeper (that the 100m recommended) cannot be installed on *alia* due to the design of the vessels.	The Draft EIS notes that the level of sea turtle interaction in the American Samoa longline fishery is reportedly very low based on logbook reports. Observer data would be helpful in validating logbook reports. Interviews with fishers suggest that 45 fm is the targeted mainline depth in the American Samoa longline fishery.
P73a	written - John LaGrange	I find it rather odd that in such an exhaustive document there is no consideration of any impacts that might be considered positive. For instance, there is considerable discussion of the take of albatross by longline vessels, but there is no consideration of benefit the albatross receive from feeding around the longline boats. A conservative estimate would be 4,000 lbs of offal and discarded bait per swordfish trip made available to albatross. This gives over a million pounds of high quality food per year to the birds. This may have a particularly beneficial effect since much of it is made available relatively close to the nesting areas. With good bird interaction reduction measures in place it is not inconceivable that the longline fishery could have a net positive effect on the albatross population in the future.	We disagree because there is no scientific evidence in the global literature suggesting that albatrosses or other seabird populations have increased or benefited from the availability of bait or offal provided by fisheries.

Tracking No.	Commenter	Comment	Response
P73b	written - John LaGrange	In the case of sea turtles, there is no mention of the mortalities avoided by the fishery harvesting large pelagic sharks. Personally I have caught two sharks in the last year that were large enough to swallow a good sized turtle whole. However one may feel about shark fishing, it would be difficult to deny that removal of some of these large sharks has a beneficial effect on the turtle population. Why is this not considered in the EIS?	While it is well documented that sharks consume turtles, at least occasionally, the level of such predation is entirely unknown. For pelagic waters, where turtles may diffuse, such predation may actually be low. Further, few sharks attain a large enough size to prey upon all but the smallest sea turtles.
P73c	written - John LaGrange	One seeming contradiction in the DEIS re catch rate of leatherback turtles. During the time period of the observer program, the catch rate of these turtles has not significantly changed. Normally constant CPUE in a fishery indicates a stable population. In this case the population is said to be decreasing rapidly. I would like to see a cogent discussion of this contradiction in the EIS.	The duration of data collection by the observer program and the limited quality of data preclude such an analysis.
P73d	written - John LaGrange	I find a rather odd disconnect between the analysis and the conclusion. The preferred alt does not seem to be supported by the data presented. This alt would stop all swordfish fishing, action resulting from the immediate need to reduce leatherback turtle mortalities. The analysis, however, does not conclude that stopping swordfish longlining in the Hawaii fishery would accomplish any reduction. In fact, it strongly suggests that due to relocation of effort and increased imports, the mortalities of leatherback turtles would be increased. Of the swordfish fisheries that we have any data on, the Hawaii fishery has the lowest levels of turtle bycatch. Shifting effort from Hawaii to any other fisheries will surely cause more turtles to die.	Even if the Hawaii-based longline fishery is responsible for only a small portion of the total turtle mortaility, NMFS must meet the legislative mandate under ESA. Based on new information, comments, and analyses, including the Pelagics BO, a new Preferred Alternative (Alternative 10) has been developed.
P73e	written - John LaGrange	A number of projects designed to reduce turtle takes by gear modifications are already underway. p4-192 says "turtle mortality may be significantly lower under alternatives that attempt to alter fishing methods than under more restrictive measures that eliminate Hawaii effort and therefore superficially appear more effective." and the conclusion p4-193 "regulations that remove vessels from the fleet appear to be a relatively ineffective tool for lowering the global mortality of turtles and seabirds.' Why then does the preferred alt propose to remove the entire swordfish fleet? This is a lose-lose (fishing fleet and turtles) alternative.	Even if the Hawaii-based longline fishery is responsible for only a small portion of the total turtle mortaility, NMFS must meet the legislative mandate under ESA. Based on new information, comments, and analyses, including the Pelagics BO, a new Preferred Alternative (Alternative 10) has been developed.
P74a	written - John & S Myking	Strong opposition to the preferred alternative. We do not feel the Preferred Alt is supported in the DEIS, and especially so when considering any closure whatsoever of the Hawaii longline fishery.	Comment expresses a preference. No response required.

Tracking No.	Commenter	Comment	Response
P74b	written - John & S Myking	The recommendation to close the longline fishery during April and May has no scientific basis or justification,	Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P74c	written - John & S Myking	but it will have a devastating impact on us personally, on our crew and their families, and on the State of Hawaii as a whole. Personally, 100 percent of our income is from fishing. This will mean almost three months of no income to our family because we will not get paid until late June for a June trip. Typically April and May are fair fishing months with fair fish prices, while June and the summer months are typically slow for us and the fish price is down.	Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P74d	written - John & S Myking	We as fishermen pay our federal taxes on March 1, and our state taxes in April. How would we be able to cover these payments, while having no income to live on from April through June. We certainly cannot afford to take a two-three month lay-off.	Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P74e	written - John & S Myking	We also cannot afford to lose our local market for fish. This would be a disgrace! Once the importing of foreign fish takes over, it will be very difficult to gain our market back.	Information on the increased reliance on imported fish has been added. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P74f	written - John & S Myking	And yet, the foreign fisheries are not under any turtle regulations.	United States has no jurisdiction over foreign fleets on the high seas.
P74g	written - John & S Myking	The State of Hawaii also cannot afford to lose the longline industry. It will have a severe chain reaction across the state. We generate a lot of business in this state, just in maintenance and supplies on the boats.	Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.

Tracking No.	Commenter	Comment	Response
P74h	written - John & S Myking	Turtle interactions are very rare when fishing ahi, so why make any change at all to this fishery. It should continue with its current 20% observer coverage and with no closures. The swordfish fishery should be reopened, with 100% observer coverage to gather necessary data on turtle interactions in that fishery. We would be in favor of a research data collection program, in favor of attending protected species workshops, and in favor of gear modifications for swordfish. We may also be in favor of other means to eliminate turtle interactions, as they are presented.	The new Preferred Alternative (Alternative 10) will permit a year-round tuna longline fishery, although the time/area closure will impact operations and profitability. If Option A is implemented as proposed, there will be 100 percent observer coverage for the experimental swordfish sets.
P74i	written - John & S Myking	We ask you to please reconsider the recommendation of the preferred alternative. Closing the longline fishery (for any amount of time) is not the answer to protecting turtles. However, it would force us into the unemployment and food-stamp lines, or force us to fish the unregulated fisheries, which already show signs of strain and where even more turtle interactions may occur.	The new Preferred Alternative, Alternative 10, permits year-round tuna longlining, although with a time/area closure. If Option A is implemented as proposed, swordfish fishers could continue to fish under close supervision. If gear or fishing techniques are developed to significantly reduce turtle interactions with shallow sets, that could be grounds for re-initiation of the Section 7 consultation and production of a new BO.
P75a	written - Frank Goto	NMFS has proposed Alternative 7 which will harm small business and economic diversification, and thus will negatively impact Hawaii during a critical period of both economic recovery and economic diversification.	Changes were made in 4.8.8 to reflect seasonal closure market issues. Past Hawaii economic conditions are not acknowledged in the text since the overall U.S. economy is robust. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P75b	written - Frank Goto	Alternative 7 proposes closing Hawaii's tuna longline fishery for two months every year, shutting off 90 percent of the fresh tuna supply for those two months. The fresh fish export trade has been built over the past decade by local marketers and the State will be crippled and tuna imports will be substituted for locally produced fish. Economic damage would not be limited to Hawaii's seafood industry. Local longline fish is cross-merchandised with tourism. It is an integral part of the foundation of Hawaii's world-renowned regional cuisine. Consuming tuna and other pelagic fish that is actually caught in the waters around Hawaii is part of the unique experience of a Hawaii vacation.	Changes were made in 4.8.8 to reflect seasonal closure market issues, however, the new preferred alternative permits year-round tuna-style fishing outside of the seasonally-closed area. Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.

Tracking No.	Commenter	Comment	Response
P75c	written - Frank Goto	The Hawaii longline fishery faces these severe closures and impacts due to government's lack of responsibility. Environmental organizations have taken aim at closing fisheries through the use of environmental legislation such as ESA, NEPA and MMPA. Because federal agencies fail to prepare proper impact statements or biological opinions under these acts, the fishing industry, which has complied with federal regulations, has taken the brunt of the court ordered actions. In Hawaii's case, the fishing industry is comprised of small business people who can't absorb attorney fees, media campaigns and other non-operational costs. Our longline industry is now faced with losing a $33 million swordfish fishery because it has played by the rules.	NMFS is in the process of comprehensively examining all U.S. fisheries to determine the best strategies for maintaining compliance with the legal requirements of ESA, NEPA, the MMPA, and other applicable laws in order to avoid future legal challenges to U.S. fisheries, including the HI longline fishery. The ESA requires NMFS to implement reasonable and prudent measures to avoid the likelihood of jeopardizing the continued existence of endangered species, such a sea turtles. In order to reduce economic effects from fishery reductions, NMFS is investigating measures to help increase sea turtle populations and to mitigate the population-level impacts of sea turtle mortality from longline gear interactions. The decision to close the directed swordfish fishery is based on sea turtle population declines and on data that show most of the sea turtles takes in this fishery were by vessels targeting swordfish or a mixture of swordfish and tuna using shallow set longline gear. Recognizing that the Hawaii-based longline fishery is a small portion of the total amount of total fishing effort in the Pacific Ocean, NMFS plans to conduct research needed to develop gear technologies and fishing strategies for reducing sea turtle mortality resulting from longline gear interactions.
P75d	written - Frank Goto	Alternative 7 will also put sea turtles in further jeopardy. Section 4.11 analyzes who the cumulative effects would bring about a higher net mortality of sea turtles: 1. By displacing Hawaii swordfish longline effort to areas where takes and mortalities of turtles are likely to be higher; 2. By the U.S. market substituting fresh swordfish imports from foreign fisheries with higher turtle take/mortality rates; 3. By the Hawaii market substituting fresh tuna import from foreign fisheries with higher rates of protected species interactions and wasted bycatch to replace domestic tuna production during the seasonal closure. Therefore the DEIS does not follow the 'precautionary approach' which supposedly guides NMFS fishery conservation policy.	NMFS has considered this comment and available scientific information and revised the preferred alternative in the Final EIS. The new preferred alternative will close the directed swordfish longline fishery and implement a two-month (April and May) area closure area for the tuna fishery. The area closure will prohibit all longline fishing south of 15° N lat., north of the equator (0° lat.), between 145° W long. and 180° long., however, tuna longline fishing will be allowed throughout the year outside of the closed area. In addition, NMFS is working to develop experiments that may lead to new longline fishing strategies or gear modifications for reducing sea turtle/longline gear interaction rates throughout the Pacific Ocean. This research may lead to new fishing methods to target swordfish that have much fewer interactions with sea turtles than existing swordfish longlining techniques.
P75e	written - Frank Goto	Because of the turtle's Pacific-wide life history, international nature of the fishery, and global economy, any true resolution to this issue will be addressed in its totality on a Pacific-wide, if not global, scale.	Agree. No response required.

Tracking No.	Commenter	Comment	Response
P75f	written - Frank Goto	Chapter 1 notes that NMFS is striving for 'ecosystem' management in U.S. fisheries policy. The sea turtle problem is an ecosystem problem - one that involves sea turtles worldwide as well as human populations, seafood marketing and consumption worldwide.	Agree. No response required.
P75g	written - Frank Goto	Our industry has repeatedly demonstrated its leadership. [e.g., emphasizing tuna quality, fresh fish cuisine, discards to many items, system for assuring seafood safety. Controls established by the Council include limited entry, closed areas, logbook, shipboard observer and VMS requirements. Our industry is willing/capable to lead again to contribute to sea turtle conservation efforts. Option A will improve the scientific basis for sea turtle conservation and encourage modifications in fishing gear and tactics that could be exported worldwide. As the DEIS p4-193 says, until other countries adopt regulations similar to those of the Hawaii fleet, regulations that remove vessels from the fleet appear to be ineffective as will simply transfer the fish harvests and interactions to unregulated fisheries.	Agree. No response required.
P75h	written - Frank Goto	The two-month closure of the Hawaii tuna longline fishery would shut down 90 percent of the State's fresh pelagic fish supply, causing at least temporary unemployment for all longline crews and for approx 80 percent of workers in support marketing businesses. Alternative 7 would also totally displace the Hawaii swordfish longline fishery, all swordfish vessel crews and all workers in support services and marketing businesses.	Although Alternative 7, which had a complete two-month closure of the fishery was the preferred alternative in the Draft EIS, Alternative 10, which permits tuna fishing in some areas year-round, is the preferred alternative in the Final EIS.
P75i	written - Frank Goto	By substituting legalisms for science-based management, the preferred alt actually works against the long-term survival of the sea turtle species. Alternative 7 is lose-lose for both Hawaii seafood industry and the sea turtles. When longline closures are put in place, the demand for swordfish and tuna will still exist. Products will be supplied through other sources where poorly regulated fisheries will continue to have adverse effects on protected species.	Although the preferred alternative has changed to permit year-round tuna longlining, prohibition of shallow sets may result in swordfish boats relocating to other areas with less restrictive management regimes and swordfish market demand being filled from foreign sources. If Option A is implemented as proposed, some swordfish fishers could continue to fish under close supervision. If gear or fishing techniques are developed to significantly reduce turtle interactions with shallow sets, that could be grounds for re-initiation of the Section 7 consultation and production of a new BO.

Tracking No.	Commenter	Comment	Response
P76a	written - Wayne Samiere	The problem with Alternative 7 and other alts based on the model is the wide confidence intervals of the predicted effects on sea turtle takes. The possible error is so great that an alternative predicted by the model to produce a larger reduction in 'takes' than other alts might actually produce a larger take than other alternatives. This problem causes the alts to overlap one another so much, when the possible error of the estimates is considered, that their potential effects cannot be clearly distinguished.	While the Kobayashi-Polovina model is technically correct, we agree that the paucity of data results in uncertainty in the analysis. As the same assumptions are used to model all the alternatives, the results are useful for comparative purposes. The analyses recognize the limitations of the model.
P76b	written - Wayne Samiere	Two alternatives, including the preferred, prohibit shallow sets due to higher interaction rate with turtles. Yet nowhere in Chapter 2 is there an alternative that considers the much higher rate of turtle interactions with squid-baited longline hooks (characteristic of shallow sets), as opposed to fish-baited longline hooks (characteristic of deep sets). This omission is a serious oversight, although one that could be corrected by incorporating Option A as part of a revised preferred alt.	The hypothesis of the commenter has been added to the Chapter 2 discussion of Option A.
P76c	written - Wayne Samiere	Consider the foraging behavior, Chapter 3.6. The diet of the leatherback consists of cnidarians, it obviously does not feed on squid baited on longline hooks so it is logical that leatherbacks bite on squid because of its resemblance to the light-colored, gelatinous creatures that are its major prey items. Do not implement your preferred alternative without testing if simply changing the appearance of the bait (or switching to fish bait) could significantly reduce longline fishing interactions, at least with the leatherback.	The hypothesis of the commenter has been added to the Chapter 2 discussion of Option A.
P76d	written - Wayne Samiere	The Hawaii longline fishery is the place to do the tests. The fact that the turtle interactions are rare is not an argument against experimental fishing any more than it was an argument against the modeling and management actions ordered by the court or against the DEIS alternatives.	The long-term solution will require a global effort. Information has been added to Chapter 2 to indicate industry's willingness to participate as evidenced by public testimony on the Draft EIS both at public hearings and in written submissions.
P76e	written - Wayne Samiere	Sea turtle takes and mortalities associated with fishing are a serious global problem. The DEIS should not ignore an alternative, such as switching to fish bait or coloring squid bait, that may have promise for reducing sea turtle interactions on a broad scale if successfully tested and exported worldwide through education and outreach programs.	The long-term solution will require a global effort. The hypothesis of the commenter has been added to the Chapter 2 discussion of Option A.

Tracking No.	Commenter	Comment	Response
P76f	written - Wayne Samiere	Implementation of NMFS' preferred alternative could put sea turtles at greater risk (as per sec 4.11). When there is so much uncertainty, conservative action should be taken, following the precautionary principle. Testing simple means for possible reductions in sea turtle takes is the more conservative action, whereas regulation based on model predictions with a wide range of possible error is not precautionary.	Based on new information, comments, and analyses, including the Pelagics BO, a new Preferred Alternative (Alternative 10) has been developed. Even if the Hawaii-based longline fishery is responsible for only a small portion of the total turtle mortaility, NMFS must meet the legislative mandate under ESA. While Option A, the fishing experiment, is not part of that alternative, it offers the promise of developing turtle interaction deterrent measures applicable to both domestic and foreign fisheries.
P77a	written - Rufo Lujan	None of various Chamorro rights organizations on Guam were consulted on the impact of the DEIS to the Chamorros. The application of federal laws and regulations without first consulting the Chamorros is un-democratic and a blatant abuse of authority. If the non-consultation was based on ignorance on the existence of Chamorro organizations then I hope that this testimony will have served a useful purpose.	A public hearing was held on Guam to accept any and all comments on the Draft EIS, the alternatives, and the analysis. The EIS recognizes that Guam's indigenous Chamorros are the single largest group of the total resident population of Guam.
P77b	written - Rufo Lujan	Guam legislature has claimed jurisdiction over all living and non-living resources within Guam's EEZ. Chamorro indigenous rights groups claim self-determination for Guam from the U.S. federal government [which would include jurisdiction over their own EEZ.]	One of the issues identified during scoping focused on jurisdictional matters (DEIS ES-8). At present, the position of the U.S. government is that the United States claims, and will exercise in the manner provided for in the Magnuson-Stevens Act, soverign rights and exclusive fishery management authority over all fish within the exclusive economic zone, and, in defined instances, beyond the EEZ. Additionally, however, the Magnuson-Stevens Act recognizes the importance of fishery resources adjacent to a Pacific Insular Area such as Guam, and seeks to ensure these resources are explored, developed, conserved, and managed for the benefit of the people of such areas and the United States.

Tracking No.	Commenter	Comment	Response
P78a	written - Eric Gilman (Natl Audubon Society)	The preferred alternative should be amended to make it consistent with the non-discretionary terms and conditions required by the Albatross BO. Furthermore, the preferred alternative should be consistent with the UN FAO's IPOA–Seabirds and the U.S. draft National Plan of Action being prepared to comply with the FAO IPOA - Seabirds. The U.S. FWS BO requires the use of thawed and blue-dyed baits, strategic offal discharge, and night setting for Hawaii longline vessels targeting swordfish and conducting mixed sets, and requires thawed and blue-dyed baits, strategic offal discharge, and use of a line setting machine with weighted branch lines for Hawaii longline vessels targeting tuna. The BO also requires fishers to attend an annual educational workshop, requires the production and distribution of an identification card on the short-tailed albatross, includes provisions for onboard observer coverage, outlines a protocol to handle and release injured short-tailed albatross, and specifies a protocol to process dead short-tailed albatrosses. The IPOA-Seabirds provides guidance for the contents of national plans, stating that they may contain provisions for assessments to determine the extent and nature of a State's incidental mortality of seabirds in longline fisheries, prescribe appropriate longline fishery-specific mitigation measures, contain plans for research and development, prescribe outreach and education activities, and provide guidance for data collection programs. As currently written, the second bullet of Alternative 7 is unclear and not consistent with either the BO or IPOA - Seabirds.	The EIS and all alternatives have been revised to address the content and terms and conditions of the short-tailed STAL BO. It is currently unclear to what extent the FAO International Plan of Action [IPOA] - Seabirds, and the draft U.S. National Plan of Action [NPOA] (if and when they are adopted by the United States), will require any modification to fishery-related activities beyond that which will be required as a result of the BOs and EIS.

Tracking No.	Commenter	Comment	Response
P78b	written - Eric Gilman	The DEIS preferred alternative would result in the elimination of the HI swordfish longline fishery, and therefore would result in a significant reduction of seabird bycatch in Hawaii longline fisheries. However, implementation of a suitable combination of seabird deterrent measures could also achieve a significant reduction in seabird mortality in the Hawaii longline fisheries without eliminating the swordfish fishery. Reductions in excess of 90 percent in seabird catch rates in longline fisheries can be achieved immediately using cost-effective and likely cost-saving mitigation techniques and procedures already developed, but enforcement of some of these mitigation measures can be problematic. Enclosed please find a 17 August 2000 letter to your office commenting on the July 2000 proposed rule to reduce the incidental catch of seabirds in the Hawaii pelagic longline fishery, and the enclosure that accompanied that letter. As explained in this enclosed letter, night setting and seabird deterrent measures that entail fixed gear requirements are effective and enforceable and could achieve significant reductions in seabird mortality in Hawaii pelagic longline fisheries. I recommend that the DEIS require Hawaii longline vessels operating north of 23° N. latitude to employ a combination of these referenced effective and enforceable measures. This may result in the DEIS requiring more stringent measures to avoid and minimize the incidental mortality of seabirds in Hawaii longline fisheries than is required under the terms and conditions of the short-tailed albatross BO.	Implementation of the various mitigation measures required by the STAL BO will significantly reduce seabird bycatch in either deep or shallow longline sets The prohibition of shallow sets is intended to reduce turtle interactions, a more difficult problem. Enforcement of required mitigation measures will be the responsibility of the NMFS and USCG.
P78c	written - Eric Gilman	The environmental consequences of the preferred alternative on seabirds are currently not specified in Section 4. Research conducted by Garcia and Associates, Chris Boggs (NMFS Honolulu Lab), and NMFS' statistical analysis of observer data collected in Hawaii longline fisheries to infer the effects of night setting and area closures on seabird interactions provide data for estimating the effect of the preferred alternative on seabird bycatch rates in the Hawaii longline fisheries. Furthermore, predictions of the effect from prohibiting shallow sets and requiring seasonal closures on seabird bycatch rates in the Hawaii longline fisheries also should be straightforward. This information on the effects on seabird interactions in the Hawaii-based longline fisheries needs to be included in the section on environmental consequences of the preferred alternative.	The environmental consequences of all alternatives are addressed in Chapter 4, to the degree that the data, and assumptions in the models, are reliable. Given the inherent weaknesses of the available quantitative data, assessments of actual environmental consequences of all alternatives can only be relatively qualitative in nature. It should be noted that most of the alternatives are expected to result in the significant (order of magnitude) reduction of seabird bycatch. It is impossible to predict or accurately estimate the actual quantitative effects of the various mitigation measures especially in combination as required by the STAL BO.

Tracking No.	Commenter	Comment	Response
P78d	written - Eric Gilman	The discussion of seabird mitigation measures evaluated for the Hawaii longline fisheries (Section 2.4.2) should be expanded to also include information on the enforceability of each measure. The measure on strategic offal discards should be amended to state that hooks should be removed from any offal discarded at sea, and I recommend that, although inconsistent with the short-tailed albatross BO, the preferred alternative should include prohibiting offal discharge at sea, as there is disagreement internationally regarding the long-term effect on seabird bycatch rates from strategic offal discards (e.g., CCAML studies have shown that vessels consistently discharging offal attract larger numbers of birds to the vessels and creates increased seabird bycatch rates), and there is some concern by ornithologists that oiling of seabirds from discarded offal may be an additional unobserved threat. (NOTE: Oil on feathers severely reduces a bird's ability to float and thermoregulate, as the physical presence of oil on feathers disrupts the normal architecture of the feather, allowing water to leak through the plumage to the skin. For information on the potential adverse effect on seabirds from fish oil from offal discarded by fishing vessels, please contact Linda Elliot, International Bird Rescue Research Center.)	The STAL BO was not available when the Draft EIS was prepared. Information and requirements of the BO have been added to Final EIS. CCAML studies refer to offal discharge rather than strategic offal discharge. Strategic means when necessary to distract seabirds from baited hooks.
P78e	written - Eric Gilman	p2-40, last paragraph, the higher rate of seabird catch in the Hawaii swordfish fishery compared to the tuna fishery is also likely a result of the location of swordfish effort coinciding with high densities of foraging seabirds, as you discuss on p3-106.	Agree. No response required.
P78f	written - Eric Gilman	p2-41, last paragraph of section 2.4.2, the seabird deterrent measures as currently prescribed by the WPRFMC and NMFS are not anticipated to result in any changes in seabird bycatch rates, for reasons explained in the enclosed letter. However, this point is moot as the non-discretionary measures of the US FWS albatross BO offer more protection to seabirds than the previous measures proposed by the WPRFMC and NMFS.	All alternatives in the EIS have been will be revised to reflect the non-discretionary mitigation actions required by the STAL BO.
P78g	written - Eric Gilman	Section 3.7.1, the IUCN classifications of the three Northern Hemisphere albatross species need to be updated using the IUCN 2000 Red List of Threatened Species. The section also needs to be updated now that the U.S. FWS has released the short-tailed albatross BO.	The EIS has been revised to include updated IUCN status information, and to reflect the STAL BO.

Tracking No.	Commenter	Comment	Response
P78h	written - Eric Gilman	Section 4.11.5, additional adverse effects on the three North Pacific albatross species that should be covered in the section on cumulative effects include; overfishing of seabirds' prey stock by commercial fisheries; marine pollution through external contact or ingestion (e.g., large oil spills and chronic oil discharges cause direct mortality, hatching failure, and developmental impairments; organochlorines cause local mortality and reproductive impairment and failure; heavy metals cause toxic effects; plastics entangle and kill seabirds and accumulate in the digestive tracts; and eutrophication from sewage and agricultural runoff eliminate seabird's prey); incidental bycatch in recreational fisheries, gillnets, trawls, and other commercial fisheries, but the incidence of this is relatively minor relative to seabird bycatch in longline fisheries; roosting and nesting habitat degradation; artificial increases in natural predators and predation by introduced species; unnatural sources of food from aquaculture and commercial fisheries waste; human disturbance from tourists and other visitors (for a number of seabird species, human visitation has been linked with breeding failure); and climate change and relative sea level rise may cause flooding of nesting areas and loss of nesting habitat.	Additional adverse effects are briefly discussed in the EIS. Although some of the potential effects noted here may affect albatross, limited time does not allow a detailed discussion. The STAL BO considered and discussed many of these issues. Much information can be found there.
P79a	written - Rick Gaffney	The DEIS is a wholly inadequate document that is flawed in so many ways, that it makes a mockery of the NEPA process and the requirements of the Magnuson-Stevens Act and the Sustainable Fisheries Act.	Comment states an opinion. The EIS incorporates best available information to present the analysis required by NEPA.
P79b	written - Rick Gaffney	The three post binding makes reviewing the document a struggle, with many words obscured and the information in the margins hard or impossible to decipher. That inadequacy alone would argue for a republication of the document and an extension of the time allotted for comment. At the very least, the publication of the FEIS, must be bound so as to make the document readable and all its infomration accessible to the public.	The Draft EIS may be easily disassembled for easier reading. In the Final EIS, page margins adjacent to the binding have been widened to allow foreasier reading.
P79c	written - Rick Gaffney	As an active member of the fishery community in the WPR I was surprised at how difficult it was to obtain this document. Delays in shipping and distribution, and failure to fulfill my several requests for a copy of the DEIS in a timely fashion, also suggests an extension of the public comment period is warranted.	Distribution of copies of the Draft EIS to an initial mailing list including individuals expressing interest during the scoping period was accomplished when the document was filed with EPA. Mailing to additional requesters was accomplished as requests for copies were received, and the document was made available on the internet. Announcements of availability of the document appeared in the Federal Register and in local newspapers. Extensive public comment has been received, and no extension of the 45 day public comment period is anticipated.

Tracking No.	Commenter	Comment	Response
P79d	written - Rick Gaffney	The public hearing process was another travesty. Notices of the public hearings were all but non-existent. Many people found out about the public hearing through friends less than24 hours in advance of the hearing, and therefore had no ability to digest the DEIS and comment in any depth. The failure to inform the public would appear to be a violation of the APA and there should be a new series of publicly announced public hearings on the DEIS before the process advances.	A cover letter was transmitted with the Draft EIS and contained the public hearing schedule. Hearings were delayed until after the New Year to allow adequate review time and avoid conflicts with holiday functions.
P79e	written - Rick Gaffney	There are many indications throughout the document that the FMP preparation and DEIS development process has been rushed, which is entirely inappropriate for a document of this import, magnitude and nature. If the Council/NMFS believe that haste is critical due to the legal issues raised by the federal court, they should issue interim regulations, not an entire FMP.	In this comment as well as in comment P79a, the author confuses NEPA compliance with FMP production. The Draft EIS is not an FMP. Neither does it contain regulations. It is true that the Draft EIS production was expedited due to the Court-ordered completion date. This does not, however, compromise the conclusions of the document, which are based on the best available scientific information.
P79f	written - Rick Gaffney	On the opening page of the document, the address to which the comments are to be submitted is incomplete.	The address is complete in the Final EIS.
P79g	written - Rick Gaffney	This DEIS/FMP fails in its requirement to fairly and completely consider all the fisheries it purports to cover. It fails to broadly consider the cumulative environmental and social impacts of those fisheries and of each of the alternatives presented by the DEIS/FMP.	The comment is an opinion. No response required.
P79h	written - Rick Gaffney	The pro-commercial fishing bias of this DEIS/FMP is obvious in nearly every paragraph of the document. The presumption and bias seems to be that the highest and best use of each species considered, is in its landed value.	When determining industry impacts it is important to use commercial prices. The landed value is not the total value but is a useful proxy for impacts to the fleet itself. As stated in the text, landed value does not cover the overall impact to the economy which includes an impact multiplier. There is little to suggest that the closure will reduce the overall, international mortality of swordfish or tuna so other types of values may not be applicable.
P79i	written - Rick Gaffney	At the same time considerations of "essential fish habitat" are virtally ignored.	EFH designations are discussed in Sec 3.3.1-3.3.2.

Tracking No.	Commenter	Comment	Response
P79j	written - Rick Gaffney	This DEIS/FMP is heavily focused on responding to recent litigation and therefore the impacts of the longline fishery on turtles and seabirds. While worthy of concern, current litigation should not impact the conclusions (as they seem to therein) nor overshadow the other pressing aspects of an EIS or a FMP, as they do in this document and its conclusions.	The focus of the EIS reflects the relative importance of the Hawaii-based longline fishery within the Pelagics FMP-managed fisheries in the Western Pacific Region. NEPA is structured to encourage analysis of issues that are ripe for decisionmaking. Where such issues have not yet emerged, development of alternatives is merely hypothetical. In this case, there are no prohibitions that apply to any other specific pelagic fishery in the region, nor are there reporting and recordkeeping requirements, or even requirements for federal permits, for any other specific pelagic fishery. Where specific issues are apparent, such as the potential gear conflict issue in American Samoa, alternatives have been developed.
P79k	written - Rick Gaffney	This DEIS/FMP is clearly a continuation of the old "fishery specific management approach", when what has been mandated by Congress is an ecosystem approach. What we need is a new fisheries ecosystem management plan, what we have apparently been given herein is NMFS/WESPAC preferred list of alternative for their favored commercial fisheries.	The author confuses the Draft EIS and the FMP. The document fulfills NEPA requirements. It discloses the likely impacts of a broad range of potential alternatives. It is not intended to establish fishery policy or regulations. These processes will progress independently.
P79l	written - Rick Gaffney	According to the list of fisheries listed in the abstract as covered by the DEIS, the document ignores several other fisheries including subsistence and artisanal fisheries, as well as the non-troll charter, sport tag and release and recreational pelagic fisheries. The lack of adequate information about the various recreational fisheries in the Western Pacific is one of the huge failings of this document.	The focus of the EIS reflects the relative importance of the Hawaii-based longline fishery within the Pelagics FMP-managed fisheries in the Western Pacific Region. NEPA is structured to encourage analysis of issues that are ripe for decisionmaking. Where such issues have not yet emerged, development of alternatives is merely hypothetical. In this case, there are no prohibitions that apply to any other specific pelagic fishery in the region, nor are there reporting and recordkeeping requirements, or even requirements for federal permits, for any other specific pelagic fishery. Where specific issues are apparent, such as the potential gear conflict issue in American Samoa, alternatives have been developed.

Tracking No.	Commenter	Comment	Response
P79m	written - Rick Gaffney	The constant implication throughout the document is that commercial fishing is the 'dominant' form of fishing in the region (ES.1.2, 1.4.3). Yet, including the value of the charter sport fisheries of the region, recreational fishing clearly outpaces all other forms of fishing in terms of the economic value. There are more charter sport fishing boats than longliners in Hawaii; there are more recreational fishermen than commercial fishermen in the region; recreational fishing expenditures have a higher multiplier than commercial fishing; the recreational/sport/charter segment of the fishery therefore has the highest economic value. In almost every category, save the market value of the landed catch, recreational fishing is clearly the 'dominant' pelagic fishing activity in the region, yet this DEIS/FMP constantly suggests otherwise.	This document is a NEPA document for an FMP. As an EIS it necessarily narrows the infinite range of alternatives. Chapter 3, the affected environment, does discuss recreational and charter pelagic fisheries in the region. Clearly, as the comment suggests, the importance or "value" of any given fishery can be assessed in different ways based on the number of participants, total landings, direct revenues, indirect economic benefit, or social value. For this reason, people may disagree on which fishery is most important or valuable. This EIS does not argue (or imply) that commercial fisheries are more important, it simply focuses on these fisheries because they generate more environmental impacts.
P79n	written - Rick Gaffney	ES.1.1 says comprehensive examination, but as fails to consider conditions in all of the pelagic fisheries, isn't; also doesn't detail all possible mutual or cumulative effects or social impacts.	The assessment of the social impacts of alternatives is based on the best available information.
P79o	written - Rick Gaffney	Es.1.2 conflicts with information ES.8 "technical data available is incomplete and uncertain" and deficiency in availability of catch and effort data for the recreational sector. How then can the DEIS conclude that Hawaii longliners dominate the other fisheries if it admits that the data are incomplete and uncertain?	All data strongly support the supposition that the Hawaii longline fleet is the largest Hawaii-based fleet interacting with endangered species in terms of number of boats, species targeted, etc.
P79p	written - Rick Gaffney	pES-3 "there is some chance of local catch competition": more than a chance, there is actual NMFS documentation based on tag and release studies of the blue marlin that this occurs. Also for yellowfin tuna and broadbill swordfish, their availability has declined dramatically since the advent of large-scale Hawaii longlining.	All available data indicate that the availability of PMUS in Hawaii waters is determined by the strength of broader pan-Pacific populations. The impact of the Hawaii longline fleet on these populations (especially blue marlin and yellowfin) is negligible when compared to total effort. There are no foreseeable scenarios that would results in the Hawaii longline fleet causing local (coastal) catch competition for marlin.
P79q	written - Rick Gaffney	ES.2 does not include Use Conflicts under Areas of current controversy.	The Executive Summary includes a description of the emerging issue of gear conflicts in American Samoa. Gear conflicts around Hawaii and Guam have been minimized by the imposition of longline exclusion zones around those islands. Those are no longer current issues requiring analysis of alternatives.
P79r	written - Rick Gaffney	pES-7 details the weaknesses of the data collection process while ignoring the dearth of data on the recreational/sport/charter fishery until the last sentence.	The Executive Summary is a concise overview of issues and conclusions. More details can be found in the body of the text.

Tracking No.	Commenter	Comment	Response
P79s	written - Rick Gaffney	pES-8 (also 2-22) refers to "possible" impact of Hawaii longline on marlin catch; not possible, documented by NMFS.	All available data indicate that the availability of PMUS in Hawaii waters is determined by the strength of broader pan-Pacific populations. The impact of the Hawaii longline fleet on these populations (especially blue marlin and yellowfin) is negligible when compared to total effort. There are no foreseeable scenarios that would results in the Hawaii longline fleet causing local (coastal) catch competition for marlin.
P79t	written - Rick Gaffney	Social characteristics of the sport/charter/recreational fisheries are virtually ignored in the DEIS/FMP (contrary to Magnuson-Stevens Act guidelines) yet they are arguably the most significant component of the "value" of those fisheries.	The social characteristics of various groups that participate in Hawaii's pelagic fisheries, including sport/charter/recreational fishers, are discussed in Section 3.11.
P79u	written - Rick Gaffney	p1-11 Six of the ten standards of the Magnuson-Stevens Act are not met by this document (1,3,5,6,8,9).	Magnuson-Stevens Act National Standards apply to FMPs; this document is an EIS. This document does not need to demonstrate whether or not the Pelagics FMP meets national standards. (This is demonstrated in the FMP and each of its amendments.)
P79v	written - Rick Gaffney	p1-12 WESPAC has never facilitated participation by the recreational/charter/sport fishing community [contrary to council system purpose]. Description of Council workings do not reflect the reconfigured WESPAC advisory councils which further disenfranchise community interests from the staff-directed politically-driven management of the WPR fisheries.	The discussion in Section 1.3 is generic rather than specific to the Council. The structure and function of the Council are outside the purview of this EIS, which focuses on the impacts of fisheries covered by the Pelagics FMP. This EIS cannot change the council system or the structure and function of the Council. Please note that the Council was not directly involved in production of this EIS, although they kindly provided data and reports.
P79w	written - Rick Gaffney	p1-13 third paragraph. WESPAC is in fact completely controlled by commercial fishing interests to the virtual exclusion of most other fisheries [contrary to intent of enabling legislation].	The discussion in Section 1.3 is generic rather than specific to the Council. The structure and function of the WPRFMC are outside the purview of this EIS, which focuses on the impacts of fisheries covered by the Pelagics FMP. This EIS cannot change the council system or the structure and function of the Council. Please note that the Council was not directly involved in production of this EIS, although they kindly provided data and reports.
P79x	written - Rick Gaffney	p1-14 re the RFA: DEIS/FMP fails to consider the broad impact of fishery management regulations on small sport fishing charter busines in Hawaii, Guam, CNMI, American Samoa.	This discussion of laws and regulations applies to the preparation of FMPs, not EISs. As stated, RFAs analyze the economic impacts to those directly regulated by proposed regulations and are part of FMPs and amendments. If sports/charter fishing were to be regulated pursuant to a FMP/amendment, the economic impacts would be analyzed. (Currently no federal regulations pursuant to the Pelagics FMP apply to non-commercial fisheries.)

Tracking No.	Commenter	Comment	Response
P79y	written - Rick Gaffney	DEIS also required to include a detailed impact analysis and fully consider both the beneficial and adverse ecological, economic, and social impacts of proposed management measures - fails, particularly re subsistence, artisanal, recreational, sport and charter fishermen as well as overall impact of commercial fisheries.	The analysis uses the best available data to determine impacts to the affected sectors of the economy.
P79z	written - Rick Gaffney	Section 1.4.1 historic assertion is grossly incomplete. This section also fails to mention the lengthy history of sportfishing, and the importance of the species that cause anglers to visit Hawaii and other Pacific islands as early as 1914 in pursuit of fish.	The meaning of "historic assertion" is unclear but it is acknowledged that this section focuses on commercial fisheries. This introduction is meant to be a concise summary of pelagic fisheries within the context of the alternatives and actions discussed in the EIS. The EIS focuses on the impacts of commercial fisheries, and in particular the Hawaii-based longline fishery. For this reason, most attention is given to the distant water fisheries that target the same or related fish stocks. Although recreational and charter fisheries could be discussed in more detail in this summary, it does not seem germane as an introduction to the issues addressed by this EIS.
P79aa	written - Rick Gaffney	Table 1-3 is incorrect. Suggests Hawaii troll charter and handline fleet consists of "several thousand vessels"; actually, closer to 10,000 active vessels. Details listed for PRIAs troll and handline also incorrect, and most of the vessels fished there are active only on a seasonal basis.	Clarifications have been added to the EIS.
P79bb	written - Rick Gaffney	Section 1.4.3 charts in this section detail catch in terms of mt landed, but fail to measure the catch in terms of economic value and or impact.	This is meant to be a very brief overview of pelagic fishing, focusing on the commercial sector. Other sections of the EIS, such as section 3.10, discuss economic value and impacts.
P79cc	written - Rick Gaffney	p1-22 incorrect assertion "no scientific evidence that other sectors have suffered as a result of longline fishing". There is evidence (NMFS tagging records). And there are few if any efforts made to measure the impact of this fishery on the other sectors.	Both here and elsewhere in the EIS peer-reviewed papers and reports are cited as a basis for this assertion.

Tracking No.	Commenter	Comment	Response
P79dd	written - Rick Gaffney	p1-22 suggests that swordfish landings rose dramatically early in the longline fishery but fails to note that they decline dramatically for sport and handline fisheries over the same period.	Accurate time series data on landings and catch composition for non-commercial fisheries are not available so it is difficult to substantiate a decline in catches. Swordfish are not a primary target species for charter and sports fishermen (see Sections 3.10.3.2.2-3.10.2.2.3 of the EIS) and fishing grounds for the Hawaii-based longline fleet and non-commercial fishermen are different. (Longline vessels fish farther offshore.) Longliners may intercept some swordfish that might otherwise be caught by charter and sports fishermen but it is not possible to demonstrate a causal link between increases in swordfish landings by longliners and (undocumented) changes in non-commercial landings.
P79ee	written - Rick Gaffney	p1-26 incorrect suggestion that blue marlin may be the only species threatened, when it is clear that both swordfish and various sharks are also threatened.	It is not clear that Hawaii-based longliners are catching swordfish at unsustainable levels (see Section 3.4.1.1 of the EIS). The issue of shark finning and concerns about sustainability are identified in this chapter and this discussion has been expanded slightly in the Final EIS.
P79ff	written - Rick Gaffney	Annual quota of 50,000 sharks set by the FMP is unrealistic in light of the Congressional action to ban finning. There should be no shark fishery in the WPR based on the collapse that has ensued with every pelagic shark that has ever been pursued.	The EIS has been revised to reflect the new U.S. law prohibiting shark finning and discard of carcasses at sea. This law was not enacted at the time of Draft EIS preparation.
P79gg	written - Rick Gaffney	p1-26,27 question re sustainability of blue marlin very important and is given short shrift in the DEIS/FMP. The balance of discussion is inadequate. The highest and best use of blue marlin is in the recreational/charter/sport industry and there should zero retention allowed by the longline fleet.	This introductory chapter is meant to briefly touch on the many issues raised by pelagic fishing in general and the Hawaii-based longline fishery in particular. Issues surrounding blue marlin are in fact given more attention than other issues that may be of equal concern to other interest groups. Since Hawaii-based longline vessels do not target marlin and post-hooking survival is likely very low, a zero retention policy would not significantly reduce the fishing mortality of marlin and therefore would not make more fish available to the non-commercial sector. No benefit would accrue while such a policy would incur some cost since incidentally caught marlin could not be retained and sold.
P79hh	written - Rick Gaffney	p1-29 points out taxpayers fund management-related expenses; as such should have a reasonable expectation of balanced management of "their" fishery by NMFS/Council, but they do not so long as the current exclusion of recreational/sport/charter fisheries is continued.	This paragraph has been deleted in the Final EIS.

Tracking No.	Commenter	Comment	Response
P79ii	written - Rick Gaffney	Sc 2.1 suggests that pelagic fish are "harvested" which implies that the fishery has been managed, which it has not. Further an economically and historically important portion of the pelagic fishery involves catch and release which is not "harvest."	Section 2.1 is a brief summary of pelagic fishing activities in the EEZ. Catch-and-release fishing is a component of sport fishing, which is mentioned.
P79jj	written - Rick Gaffney	Because of the many failings of the DEIS/FMP the only reasonable alternative is Alternative 8. All other alternatives include unacceptable levels of bycatch, continued kills of endangered and threatened species, additional take of blue marlin, various sharks and swordfish which are in decline and continued conflict with other pelagic fisheries of much higher value.	Comment expresses a preference for an alternative. No response required.
P79kk	written - Rick Gaffney	All of eight alternatives in the DEIS/FMP are focused on the domestic longline fleet and this document is supposed to be a Pelagic FMP.	The focus of the EIS reflects the relative importance of the Hawaiʻi-based longline fishery within the Pelagics FMP-managed fisheries in the Western Pacific Region. NEPA is structured to encourage analysis of issues that are ripe for decisionmaking. Where such issues have not yet emerged, development of alternatives is merely hypothetical. In this case, there are no prohibitions that apply to any other specific pelagic fishery in the region, nor are there reporting and recordkeeping requirements, or even requirements for federal permits, for any other specific pelagic fishery. Where specific issues are apparent, such as the potential gear conflict issue in American Samoa, alternatives have been developed.
P79ll	written - Rick Gaffney	Obj 2.3 of FMP is Optimal Yield - no discussion possible without inclusion of all pelagic fisheries. Discussion of economic overfishing has already been reached in the swordfish fishery and is being threatened in the yellowfin tuna and blue marline fisheries as the sport fisheries are impacted by the longliners.	The Draft EIS reviewed objectives of the Pelagics FMP but did not define them. All available scientific information was considered in the review.
P79mm	written - Rick Gaffney	2.3 also suggests goal to promote "domestic fishery values" (this is undefined and must be defined) "by enhancing the opportunity for satisfying recreational fishing experiences." These have been in decline since the mid-80s when expansion of longline - so this objective of the FMP is unmet.	The Draft EIS reviewed objectives of the Pelagics FMP but did not define them. All available scientific information was considered in the review.
P79nn	written - Rick Gaffney	Study referred to at the top of p 2-23 does not cite the study reported.	The reference for the study is listed in the pertinent paragraph.

Tracking No.	Commenter	Comment	Response
P79oo	written - Rick Gaffney	2.3.4 This paragraph invalidates virtually the entire DEIS/FMP because it admits to the lack of technical data required to manage the fishery. There can be no scientific justification for any management decision without the basic scientific data required to make that decision.	There is a difference between a NEPA analysis and an FMP. Ongoing management requires use of best available data, as is used in this EIS.
P79pp	written - Rick Gaffney	2.3.4 Fails to note the lack of adequate species biology, a problem of equal and perhaps greater import than the lack of catch and effort data. Can't develop reasonable legitimate FMPs without this data.	There is a difference between a NEPA analysis and an FMP. Ongoing management requires use of best available data, as is used in this EIS.
P79qq	written - Rick Gaffney	2.3.6 speaks of precluding waste of PMUS yet fails to include any mention of blue marlin, a species wasted regularly by longliners	Blue marlin taken for food value is not discarded, hence not wasted.
P79rr	written - Rick Gaffney	2.4.3 discusses measures to reduce mortality of sharks. There is no concurrent discussion of reducing the mortality of blue marlin, and there should be.	Given the extremely low impact of the Hawaii-based longline fishery on blue marlin populations and given the fact that blue marlin are marketed for human consumption in Hawaii, even successful methods for the reduction of blue marlin mortality in the longline fishery would have little impact.
P79ss	written - Rick Gaffney	3.3.1 breaks PMUS into marketable and non-marketable species but fails to suggest that some of those fish detailed as marketable were made so by the industry (and taxpayer dollars) after appearing initially as by-catch and they are still not target species (e.g. opah)	The categories of marketable and non-marketable were taken from Amendment 8 of the Pelagics FMP.
P79tt	written - Rick Gaffney	Question of marketability also fails to consider the marketing of Hawaii's internationally renowned Pacific blue marlin fishery and the consequent "market value" of blue (and other) marlin. Market value herein, should not just include landed value.	The value of Hawaii's internationally renowned Pacific blue marlin is reflected in its landed price and is properly accounted for. If the value is not so accounted then the market is not accurately reflecting the value. All indications are that any difference made by the commercial fishery on stocks and local availability are so minor as to be undetectable.
P79uu	written - Rick Gaffney	The EFH discussion fails to meet the requirement that it consider the impacts on that habitat of the harvest of any individual species from that habitat - the cumulative changes imparted on the EFH by the removal of one or more species	The effect of harvesting an individual species in a portion of its geographical range on the total pelagic EFH cannot currently be determined.
P79vv	written - Rick Gaffney	It also fails to report data that indicate that some species numbers (spearfish) have increased dramatically in parallel with increased longline effort.	An increase in spearfish numbers, if documented, could be the result of numerous factors, and currently has not been documented as an effect of the longline fishery.

Tracking No.	Commenter	Comment	Response
P79ww	written - Rick Gaffney	p3-11 "little is known about migration of Pacific swordfish." That said, FMP cannot manage swordfish in one part of their unknown range without risking adversely impacting the stocks.	The salient point of swordfish biology is that catch statistics are steady in the face of current fishing pressure. Additional biological information is therefore desirable (such as migration data) but not critical to evaluating the viability of the fishery.
P79xx	written - Rick Gaffney	The scientific equipment (pop-off satellite tags) required to be fairly certain about the migration of swordfish is readily available and well proven on bluefin tuna. No mention is made of obtaining this kind of data.	The salient point of swordfish biology is that catch statistics are steady in the face of current fishing pressure. Additional biological information is therefore desirable (such as migration data) but not critical to evaluating the viability of the fishery.
P79yy	written - Rick Gaffney	The impact of declining swordfish catches on the charter sport fishing fleet is nowhere detailed in this document, yet that is a critical component of any consideration of the impact of the swordfish longline fishery.	Swordfish catch by the charter sport fishing fleet is reported as catches by the commercial troll category. We are unaware of data to distinguish charter sport fishing catch from that of other commercial troll vessels. In addition, between 1987 and 1998, annual reported swordfish landings were typically in the range of 1,000 pounds, although catches in 1988 and 1989 were 2,000 pounds. Since 1987, swordfish have typically represented less than ½ of one percent (0.005%) of total combined marlin and swordfish catches for the commercial troll fleet, which includes the charter sport fishing fleet. It is difficult to document declining swordfish catches or to claim that swordfish catches are important to the charter sport fishing fleet.
P79zz	written - Rick Gaffney	3.4.1.2 is largely based on one study of black marlin published in 1985. There is a lot more biological information available on this species (Australia, etc.)	This comment is inaccurate. Extensive biological information is not available for this species.
P79aaa	written - Rick Gaffney	Black marlin is an important component of Hawaii's sport/recreational/charter catch, in part because Hawaii is the only place in the world where both blue and black marlin over 1000 lbs have been taken by one charter boat captain. Recognition of the part this species plays in the sport fishery must be included.	The fifth sentence in the introductory paragraph to Section 3.10.3.2.2 Charter Sport Fishery has been changed to acknowledge black marlin. The sentence should read as follows: "The Kona Coast of the Island of Hawaii has a long-standing reputation as a premier location to fish for big blue and black marlin, …"

Tracking No.	Commenter	Comment	Response
P79bbb	written - Rick Gaffney	3.4.1.3 is also inadequate for its lack of credible biology, and contains patently incorrect information, such as: there is no special fishery for spearfish." In fact, there is a world-famous directed fishery for spearfish in Kona that has a substantial positive annual impact on the industry. The statement "caught with extreme rarity, if at all in recreational fisheries," is patently false. In season, as many as a half dozen spearfish may be caught in a single day in the Hawaii sport/recreational/charter fishery, and these sorts of numbers have contributed to a new growth sector of the charter industry; fly fishing. Virtually all of the shortbill spearfish world records on fly rod have been taken off Kona, prompting international anglers seeking every species of billfish on fly to come to Hawaii to get a fish they will rarely catch elsewhere.	The statement in question has been amended to reflect the targeting of spearfish by sport fishers. See section 3.4.1.5, last sentence of Life History subsection.
P79ccc	written - Rick Gaffney	This section also fails to note that spearfish are a recent component of the commercial and recreational/charter/sport fishery. The increasing no. of this once rare species may be related to the increased harvest of predatory species, and must therefore be thoroughtly considered as part of this FMP.	This document is not an FMP. There is no scientific evidence for the hypothesized relationship.
P79ddd	written - Rick Gaffney	3.4.2 states that "wahoo are not a target species in fisheries" which is absolutely incorrect. They are an important species for nearly every recreational/charter/sport fisherman in WPR, and often make the difference between a successful and an unsuccessful day of recreational/charter fishing.	The pertinent sentence has been modifed to reflect that some trollers do target *wahoo* on an occasional basis.
P79eee	written - Rick Gaffney	Recent NMFS tag data regarding a 1300 mile migration of a wahoo tagged and released off Midway is not included herein, and the information that is provided is inadequate to determine the environmental impact of the wahoo fishery or to manage the larger fishery in which this species exists.	The single recapture of a tagged fish does not consitute a significant input into understanding the biology of this species. It is correct that little is known about the biology of *wahoo* but, equally, there are no indications in catch data that this species is heavily exploited.

Tracking No.	Commenter	Comment	Response
P79fff	written - Rick Gaffney	3.10.3.2.2, the description of the Hawaii Charter Sport Fishery is also flawed, weak and incomplete. Numbers cited are old and not representative of current activity/value; the import of the catch and release fishery is not mentioned; value of target species is not quantified; there are charter sport fishing boats on every populated island in the State of Hawaii and the significant economic and social impact of sport fishing tournaments is not included.	Comments on old data were addressed in response to comment P3a. The report indicates the average number of fish released by surveyed charter boats, and the economic effect of catch and release fishing is included in the available data for the charter sport fleet. We are unaware of other existing information on the importance of catch and release fishing to the charter sport fleet. The following sentences have been added to end the of second paragraph in Section 3.10.3.2.2 Charter Sport Fishery: "Information on landings and prices paid for fish sold by the charter sport fleet are unavailable because charter sport fleet landings are reported as commercial troll landings. Historical price information for pelagic species landed by commercial troll, handline, and other gear types was provided in Figure 3.10.3.2-4."
P79ggg	written - Rick Gaffney	The quantification of the economic contribution of Hawaii's pelagic charter fishing industry is based on old figures which are not accurate today and incomplete. Also it does not include tournament data, which is significant.	The available data were for "active" charter sport vessels in 1997 and the information presented in the DEIS includes all islands identified as having "active" charter sport vessels in that year. Sections 3.11 and 4.9 in the EIS provide additional information on the relationship of island communities to the pelagic fishing industry. The effect of sport fishing tournaments on the charter sport fleet is included in the charter gross revenues for a typical charter vessel, and subsequently through the regional economy. The EIS does not attempt to estimate the economic impact of other spending (for example, hotels and airfare) by persons that participate in charter sport fishing because most people visit Hawaii to participate in a number of activities, of which sport fishing is only one. It would be misleading to claim the visitor's total expenditures for charter sport fishing. We are unaware of data that would permit us to estimate the number of persons that come to Hawaii solely for charter sport fishing.
P80a	written - Paul Achitoff (Earthjustice)	We want to emphasize that we consider the elimination of swordfish longlining out of Hawaii and the other proposed restrictions on the longline fleet not only justifiable, but essential for the conservation of turtles and other protected species.	Comment is an opinion. No response required.
P80b	written - Paul Achitoff	According to a report NMFS produced for Judge Ezra, the resulting benefits will not be undermined by increases in turtle takes by foreign vessels. That report indicates that foreign fleets are unlikely to catch sea turtles protected by restricting the Hawaii-based swordfish longline fleet, for a number of reasons:	Due to lack of information, projections as to actions of foreign fleets are speculative.

Tracking No.	Commenter	Comment	Response
P80c	written - Paul Achitoff	First, the NFMS analysis (Exhibit A to declaration of Charles Karnella filed June 15, 2000) indicates that foreign fleets are not likely to increase their fishing effort in response to restrictions places on Hawaii longline fishing. The report suggests that foreign fleets are likely already fishing as much as they want, and that those fleets are unlikely to gain access to the domestic fresh fish markets currently served by the Hawaii longline fleet. Furthermore, existing effort variability by the foreign fleets exceeds the catch of the Hawaii longline fleet, so changes in the catch of the Hawaii fleet are not likely to be large enough to alter the behavior of the foreign fleets.	Due to lack of information, projections as to actions of foreign fleets are speculative.
P80d	written - Paul Achitoff	Second, longline vessels targeting swordfish set their gear differently than vessels targeting tuna, and the sea turtle take in sets targeting swordfish is approximately ten times greater than sea turtle take in sets targeting tuna (Table 7, EA Dec 15 1999). This difference in sea turtle bycatch is the basis for placing restrictions on swordfish fishing while placing relatively few restrictions on tuna fishing.	The new Preferred Alternative (Alternative 10) recognizes this difference and is constructed accordingly.
P80e	written - Paul Achitoff	Most foreign fleets catch swordfish while targeting tuna, using methods that are most similar to sets targeting tuna by the Hawaii longline vessels. NMFS' report to Judge Ezra notes: "longline vessels from Japan, Korea, and Taiwan target bigeye and yellowfin tuna, in the Pacific (and other oceans) for the sashimi market... In recent years, swordfish has not generally been a target species of these fleets but may be targeted at certain times of year, by certain fleets operating in certain areas (e.g., Japanese fleet fishing off eastern Japan) (Takahashi and Yokawa 1999)." Since the foreign longline vessels fishing near Hawaii primarily target tuna, the foreign fleets appear to be unlikely to take sea turtles at nearly rate as Hawaii vessels targeting swordfish. Thus, it appears unlikely that foreign fleets would take the sea turtles that would be protected by restricting the Hawaii swordfish fleet.	Sea turtles are vulnerable to accidental capture throughout their range of migration. The Japanese longline fishery which targets swordfish in the western Pacific does not overlap with the Hawaii-based swordfish fishery but nevertheless takes the same species and animals during migrations across the Pacific.
P80f	written - Paul Achitoff	Eliminating swordfish longlining is the only measure that has been shown to reliably and substantially reduce turtle bycatch other than, of course, eliminating all longlining effort. Since swordfish longlining is far more environmentally destructive than tuna longlining, it seems appropriate to place most of the burden on the fishery that is causing most of the problems.	The new Preferred Alternative (Alternative 10) recognizes this difference and is constructed accordingly.

Tracking No.	Commenter	Comment	Response
P80g	written - Paul Achitoff	Because no bycatch reduction measures have been developed that would allow swordfish longlining to continue without unacceptable impacts on turtles, we are firmly opposed to the implementation of any Hawaii-based experimental longline fishery. We are eager to see NMFS develop turtle bycatch reduction techniques or technology, and to see such methods employed in longline fleets throughout the world. It would be entirely inappropriate, and, we believe, unlawful, however, to allow longline fishing at the expense of critically endangered animals under the guise of experimentation. Such an approach would not be scientifically sound or in the best interests of the endangered turtles, which can no longer afford the luxury of being killed while NMFS seeks an eventual solution to the bycatch problem with a speculative, trial and error approach. Particularly in light of the length of time it would take to obtain reliable data on the effectiveness of any bycatch reduction devices in this fishery, any possible benefit to the species from such a program would be far outweighed by the continued loss of individuals from a population that NMFS, in its most recent biological opinions, has pointed out is very quickly running out of time. If field experiments with unproven methods must be performed, they should be done in a fishery with a higher rate of bycatch, and where the ESA does not place the strict limits on harming turtles that apply in the Hawaii fishery.	A new Preferred Alternative has been developed as a result of new information, comments and analyses, including the Pelagics BO. Option A is not part of the Preferred Alterantive, but may be pursued under an ESA Section 10 permit.
P80h	written - Paul Achitoff	While we understand that closing the entire fishery during April and May will have economic repercussions, we strongly support the closure. The rate of turtle bycatch in the tuna fishery is substantially lower than that in the swordfish fishery, but it is by no means insignificant in view of the species' dire predicament, and while this differential may justify treating the two fisheries differently, it does not justify ignoring the impacts of tuna longlining. A two-month closure during the season when the best available data shows an increased likelihood of leatherback bycatch is necessary to meaningfully reduce the fishery's impact. As a result of an inadequate response, nationally and internationally, to dramatically falling turtle populations and increasing fishing effort, the prospects for the Pacific leatherback are now so dim that we cannot view any level of bycatch as acceptable, and the reduction that would be produced by implementing the proposed changes without the annual two-month moratorium would not be even minimally adequate.	A new Preferred Alternative (Alternative 10) affords the necessary protection to sea turtles, and includes an April-May time/area closure element.

Tracking No.	Commenter	Comment	Response
P80i	written - Paul Achitoff	Adequate observer coverage is a critical component of any effective bycatch reduction plan, but the DEIS does not propose a minimum level of observer coverage. Experience has shown that observers are needed if there is to be any reasonable assurance that regulations designed to reduce bycatch are being followed, that they are working as expected, and that protected species are handled in the proper manner. Although fishermen can be useful for obtaining data, observers are still necessary to obtain reliable information about the number and type of protected species interactions. The historical level of coverage in the Hawaii fishery, less than five percent, has been consistently described by all – NMFS, industry, and the conservation community – as woefully inadequate. As a result of the litigation, many more observers are now trained and available for work in this fishery. We strongly support 30 percent coverage in the tuna fishery. (Since we oppose any swordfish or experimental fishery, the obvious need for complete coverage in such fisheries is moot.)	NMFS agrees that adequate observer coverage is needed to collect statistically reliable information on fishery bycatch. The new Preferred Alternative (Alternative 10) requires at least 20 percent observer coverage in the Hawaii-based longline tuna sector.
P80j	written - Paul Achitoff	In conclusion, we view the Preferred Alternative as far from ideal in conservation perspective. Under that regime the longline fishery will continue to cause serious adverse environmental impacts. It represents a compromise, allowing a viable tuna fishery to remain while scaling back the impacts of a fishery that was not suited to the North Central Pacific marine environment. On that basis, we cautiously support the Preferred Alt, without an experimental fishery and with 30 percent observer coverage.	The comment expresses a preference for an alternative, although the preferred alternative has been developed for the Final EIS. The new Preferred Alternative (Alternative 10) requires at least 20 percent observer coverage in the Hawaii-based longline tuna sector.
P81a	written - Sean Martin (HLA)	NMFS arrival at Alternative 7 as preferred is based on inadequate and inconsistent economic and biological impacts analyses, and may in fact have far greater cumulative biological impacts than stated due to underestimated vessel relocation, calling into question its validity under ESA, RFA and EO 12866.	Cumulative impact analyses (Sections. 4.11.7, 4.11.9) point out the possibility that fishing effort will relocate from Hawaii to unmonitored and poorly regulated fisheries outside the Pelagics FMP management area and the potential negative consequences for turtle populations.
P81b	written - Sean Martin	This proposal is not economically feasible as required by NMFS regulations (an alternative is “reasonable and prudent” if it can be implemented “in a manner consistent with the intended purpose of the action,” and “is economically and technologically feasible...” 50 CFR 402.02).	NMFS disagrees with the commenter’s interpretation of its regulations. The alternative may be costly and unpalatable to some, but it is economically and technologically feasible.

Tracking No.	Commenter	Comment	Response
P81c	written - Sean Martin	HLA with scientific community has developed a proposal that incorporates experimental fishing concepts and that, while not fully alleviating economic hardship for swordfish fishermen, is economically feasible and ensures the strict protection of the current sea turtle population. Most importantly, this proposal creates the opportunity for identification of measures that may make it possible in the future for swordfish fishermen to participate in the fishery without adversely affecting sea turtle populations.	The EIS considered a range of alternatives including an experimental fishery option. NMFS plans to conduct the research fishing experiment under an ESA Section 10 permit.
P81d	written - Sean Martin	These comments and proposals are not intended to represent all of the concerns and ideas HLA might have were it given an opportunity to review NMFS' draft BO. The DBO will contain an analysis of the preferred alternative in the context of the "jeopardy" standard, something that the DEIS does not include. Without reviewing NMFS' jeopardy analysis, it is difficult for HLA to define with specificity in its proposed alternative the required limits on experimental fishing, or to comment on the reasonableness of the preferred alternative.	The Pelagics BO is available. If gear or fishing techniques are developed to significantly reduce turtle interactions with shallow sets, that could be grounds for re-initiation of the Section 7 consultation and production of a new BO.

Tracking No.	Commenter	Comment	Response
P81e	written - Sean Martin	The DEIS wrongly cites effort switching as a viable option for swordfish vessels. DEIS claims that by effort switching, the swordfish fishermen could "break even" (4-34, 4-89); it is unclear what portion of fishermen the DEIS expects to successfully switch. These conclusions are highly speculative and should not be relied upon. Contrary to NMFS' assertions, effort switching is not a viable option for swordfish vessels. Scattered throughout the DEIS is evidence that effort-switching is neither technicalongliney nor economically feasible. 4-29 admits NMFS is uncertain whether vessels could bear the costs and the period of reduced productivity from switching. 4-29 swordfish vessels are not ideal tuna vessels in configuration or size, meaning overheads greater/uneconomical for tuna fishing. 4-89 to 4-90 fleet is expected to bear a $129,000 cost for purchase of line shooters to comply with Alternative 7. 4-29 significant learning curve for switching.4-34 thus the excessive costs of switching alone may cause swordfish fishery to be "all but eliminated." 4-30 also swordfish vessels require $414,000 to break even vs. tuna's $298,000. 4-30 but while swordfish vessels generate $693 per trip, tuna fleet loses $713. 5-5 thus the operating costs and debt payments for financed swordfish boats are "too high to be recovered by the revenue typicalongliney generated by tuna longline fishing." 4-29, 4-92, 4-93 also new tuna effort is unlikely to be as productive as current due to two month closure proposed under Alternative 7. 4-92 DEIS admits effort switching is unlikely to be as successful as predicted by its model. THUS inadequate and misleading to assert that some level of effort switching will mitigate impact of ending swordfish longline.	Text has been added to clarify this point. The Draft EIS does not suppose effort switching, it suggests it as a "corner" solution to bound impacts (likewise, no effort switching provides the other bound). No supposition is made in the Draft EIS as to how much if any of the fleet might switch effort. However, comments by the HLA (letter from S. Martin, Director HLA to Dr. R. Lent, NMFS, dated January 29, 2001) note in VII.A. that NMFS regulations should "permit swordfish fishermen to relocate to the tuna fishery if they so choose."
P81f	written - Sean Martin	DEIS fails to analyze the negative biological effects resulting from vessel relocation. Since effort switching is not a viable option for swordfish vessels, the likely alternative for those vessels is to relocate to areas not covered by the preferred alternative. Pacific longline fisheries that aren't regulated by this FMP have already increased in response to Court-ordered emergency rules (4-173, 5-5). While the DEIS recognizes the high potential for longline vessel relocation, it fails to adequately address the biological impacts of this likely scenario, resulting in a determination that severely underestimates the indirect impacts of the preferred alternative on sea turtles and other sensitive species.	It is true that some swordfish vessels will probably relocate to other U.S. swordfish fisheries and this is acknowledged in the EIS. Data to estimate these impacts are not available to the drafters nor is the basis to speculate on the magnitude.

Tracking No.	Commenter	Comment	Response
P81g	written - Sean Martin	DEIS ES-5 acknowledges that the relocation may result in a cumulative negative impact to listed species yet NFMS' final determination on the impact of relocation on sea turtles nevertheless states that it will have "no significant cumulative effect." (Table ES-2) Despite this, the final determination for sea birds and marine mammals appropriately finds that relocation may have a cumulative adverse effect on those species (Table ES-2).	The table referred to has been clarified in the Final EIS, and now appears in Chapter 2.
P81h	written - Sean Martin	The DEIS fails to adequately consider the "transferred effects" of increased foreign fishing. To the extent of the closure of the swordfish longline and seasonal closure of tuna longline, the market demand previously met by the Hawaii fishery wilongline be met by foreign supplies (4-203 to 4-212, 5-5). These fisheries are already less strictly regulated than the Hawaii fishery and result in significantly greater impacts to protected species (4-207) and their increased impacts could eliminate any nominal benefit created by closing the Hawaii fishery producing "greater adverse cumulative effects" on these populations (4-191, 5-5, also Kleiber declaration of June 15 2000).	Information has been added to the EIS to clarify transferred and cumulative effects of the new Preferred Alternative (Alternative 10) on sea turtles.
P81i	written - Sean Martin	4.11.9 discusses the impact to sea turtles from an increase in foreign fishing. Although the DEIS does not include a comprehensive list of fishing fleets and their take numbers, still it anticipates takes many times in excess of the Hawaii fleet (4-208, 4-209).	None of the alternatives in the EIS may reduce the cumulative effects on sea turtles, due to potential transfers of fishing effort to unregulated fisheries with higher interaction rates, such as in fisheries in central and/or South America (Section 4.11.9.5). The EIS acknowledges that analysis of the full scope of transferred effects on protected species is hampered by the relative lack of accurate fisheries statistics, observer coverage and measures provided for protected species by international fleets.
P81j	written - Sean Martin	NMFS expects that the closure of the Hawaii longline fishery will lead to a poorer conservation record in other fisheries. To the extent that foreign fishing replaces lost Hawaii longline effort, 'we would expect a higher level of potential interactions and sea turtle mortality' (Charles Karnella).	NMFS must meet the legislative mandate under ESA.

Tracking No.	Commenter	Comment	Response
P81k	written - Sean Martin	Regulations that remove vessels from the Hawaii fleet appear to be “a relatively ineffective tool” for limiting total mortality of turtles (4-219). How then, does NMFS come to a determination that the best alternative is one that closes the Hawaii swordfish fishery and, for periods, the tuna fishery, and encourages an increase in foreign fishing? The answer would be clearer, and HLA believes, different, had NMFS attempted to calculate the additional number of takes that would occur in foreign fleets as a result of each alternative and included those together with its discussion of the intended benefits of various management actions.	The EIS acknowledges that analysis of the analysis of the full scope of transferred effects on protected species is hampered by the relative lack of accurate fisheries statistics, observer coverage and measures provided for protected species by international fleets.
P81l	written - Sean Martin	The DEIS fails to base its analyses on sound science, and the resulting preferred alternative is unreasonable. The DEIS contains fundamental biological and relational uncertainties that seriously undermine the preferred alternative. The DEIS acknowledges that there are vast uncertainties regarding the actual total level of sea turtle mortalities associated with the Hawaii longline fishery. Specifically, the DEIS states that it has “insufficient information about the size and age structure and movement patterns of sea turtle populations to evaluate the effects of these interactions on long-term population viability and recover.” (ES-6, 2-31; also 2-30.)	The EIS incorporates best available information to present the analysis required by NEPA. Additionally, NMFS must meet the legislative mandate under ESA.
P81m	written - Sean Martin	Of the remaining information that the DEIS might rely upon to gain insight into sea turtle behavior and their interaction with the longline fishery, the most important is observer data. As NMFS itself acknowledges, however,”observers were not placed randomly in the fleet, but instead were placed on longline fishing vessels likely to encounter sea turtles.” (3-175) Also, “since sampling is not random a simple extrapolation of data is likely to be biased.” (3-175) This same observer data was used to generate estimates of annual incidental catch of turtles, along with data from NMFS logbooks (3-176, table 3.10-Longline20). The result is an observed 22 mortalities out of 3,252 observed sets. It follows that the actual relationship between the number of sets and mortalities is much lower. However, it appears from the DEIS that NMFS has performed a straight extrapolation despite its own admission that such an extrapolation would result in biased estimates (3-177 to 3-178)	NMFS agrees that given a sampling bias, a straight extrapolation of data is likely to produce biased results. NMFS does not agree that it has used simple extrapolations for the analysis referenced. NMFS has sought by use of various models, multipliers and design accommodations, to adjust for sample bias.

Tracking No.	Commenter	Comment	Response
P81n	written - Sean Martin	NMFS claims to have taken the "most precautionary" (2-15) approach in choosing its preferred alternative. That is to say, that lacking crucial data as outlined above, NMFS has chosen not to develop that data but, instead to eliminate the swordfish fishery. While the purpose of ESA is to protect listed species, it also requires that NMFS base its determinations on te best scientific and commercial data available in order to avoid unnecessary economic impacts. HLA believes that other alternatives may exist, such as adaptive management measures could be implemented to limit interactions now, while placing a priority on understanding sea turtle life cycles and how they interact with fishing vessels in order to incorporate that information as it is learned. Unfortunately, the preferred alternative does not include adaptive management measures but instead unduly limits immediate options for acquiring such knowledge and future options for implementing more appropriate and less damaging strategies for conserving sea turtle species.	The new Preferred Alternative (Alternative 10) is responsive to the jeopardy finding of the Pelagics BO, and conforms with the "Reasonable and Prudent Alternative" contained in the Pelagics BO. While Option A, the fishing experiment, is not part of that alternative, it offers the promise of developing turtle interaction deterrent measures that could be used in both domestic and foreign fisheries.
P81o	written - Sean Martin	The DEIS fails to properly analyze and incorporate experimental fishing options. In order to ensure that fishing restrictions are based on the best scientific and commerical data available, NMFS preferred alternative should incorporate methods for developing the requisite data on sea turtle interactions with fishing vessels. Over time, this data may alonglineow NMFS to construct reasonable, long-term fishing techniques that conserve sea turtles and other sensitive species. Not only could the development of such methods benefit sea turtles that might interact with restricted Hawaii longline fishing, but these methods might also be exported to international fisheries that have high sea turtle interaction and mortality rates in order to reduce worldwide impacts to sea turtles.	The experimental fishery option has been described in more detail in the EIS.

Tracking No.	Commenter	Comment	Response
P81p	written - Sean Martin	NMFS' failure to adopt an experimental fishing program is based on the DEIS' flawed analysis of the positive and negative impacts of such a program. The DEIS states that the "no action" alternative, which represents current fishing practices, will have no significant cumulative impact on sea turtles, yet the restricted experimental fishing measures designed to identify fishing methods with less impact than those currently in use are found to have significant cumulative effects. (Table ES-2) This failure to take into account the long-term benefits of this option is not repeated for marine mammals. For those species, the experimental fishery is more appropriately defined as having a "temporary increase in take" that "could result in methods for long-term reduction of take." (Table ES-2). Similarly, for sea birds, experimental fishing is found to have no significant impacts. (Table ES-2). NMFS' failure to consider the long term biological benefits to sea turtles is mirrored throughout the DEIS' evaluation of the experimental fishing program.	The potential for experimental fishing to have positive significant cumulative effects is clarified in the summary table at the end of Chapter 2.
P81q	written - Sean Martin	One reason the DEIS may so seriously undervalue the benefits of an experimental fishing program is because its analysis is restricted to possible negative impacts from experimental fishing. For example, at one point the DEIS admits that studies indicate that certain changes in fishing practices and gear may have promise for reducing turtle interactions. (2-17). Additionally, in its explanation of one experimental tactic, the DEIS states that "circle hooks may have the potential to increase the survivorship of sea turtles take in longline fishing and further investigation is warranted." (2-18). Despite these positive indicators, the DEIS' impacts analysis addresses only the possible negative impact that experimental fishing might have on take levels, while failing entirely to address the long-term benefits that might accrue from identifying methods that can be adopted to minimize sea turtle take worldwide (4-105 to 4-107). Similarly the DEIS fails to consider that vessel involvement in an incidental fishery will lower the incidence of relocation to less regulated fisheries, resulting in a net benefit to protected species who might otherwise be negatively impacted by such relocation. In failing to discuss and analyze these beneficial impacts of experimental fishing, NMFS has structured the analysis of this option in such a way as to ensure that experimental fishing is discounted. The result is a misleading analysis and an unsound conclusion.	The distinction between possible short-term effects and long-term benefits of experimental fishing has been clarified in the EIS.

Tracking No.	Commenter	Comment	Response
P81r	written - Sean Martin	The DEIS fails to adequately analyze the economic impacts of selected alternatives. The DEIS fails to present sufficient background information and analysis to permit decision makers and stakeholders to understand the likely economic impacts of each alternative. Moreover, the DEIS fails to conform to NMFS' draft guidelines for FMP economic analyses (NMFS, August 2000). Consequently, this means the procedural and analytical requirements of EO 12866 and the RFA have not been met. Further, by relying on economic information contained in the DEIS, NMFS will be unable to determine if a reasonable and prudent alternative based on this information is economically feasible as required by NMFS' ESA implementing regulations.	NMFS guidelines acknowledge that not all information will be available for analysis or for decisionmakers and that they must use the best available information. Since information is always being gathered and generated, it is also acknowledged that the analysis must be made at a particular point in time with the information available at that time. A memorandum summarizing the information requiments and the information provided in the EIS is included in the Adminstrative Record.
P81s	written - Sean Martin	The DEIS fails to analyze the associated economic benefits that might accrue to Hawaii swordfish fishermen both in the short term while being alonglineowed at least some limited fishing opportunity, and in the long term if the result is the eventual return to fishing with the sue of proven turtle avoidance gear. The DEIS approximates beneficial economic effects for just one swordfish longline vessel.(4-105). According to the DEIS, however, it is possible that more than one full-time vessel will be needed to provide reliable and valid information. In fact, HLA believes that numerous vessels could be allowed restricted fishing access under an experimental program designed to identify fishing methods that cause fewer impacts to sea turtles. Nevertheless, the DEIS refuses to address those possible benefits, stating that "more concrete estimates cannot be made until the experimental design protocols of the program are established," and that it would be "impractical" to project the economic impacts of an option the design of which is not finalized. (4-28, 4-105). In fact, the beneficial effects of the experimental fishing option are not even reflected in the DEIS' table summarizing economic impacts of the alternatives on longline vessels (table 4.8-1).	The Draft EIS could go only so far as the alternatives allowed - speculation beyond alternatives presented is unfounded and out of context. Option A, the fishing experiment, has been developed more fully for the Final EIS. It recommends a number of sets that would determine the number of vessels involved.

Tracking No.	Commenter	Comment	Response
P81t	written - Sean Martin	The DEIS' failure to recognize the long-term benefits of an experimental fishing program results in a preferred alternative that will not recover declining sea turtle populations. Expert testimony in CMC v NMFS advised that even complete closure of the Hawaii longline fishery will not significantly change the prospects for population viability and recovery of sea turtle species. NFMS acknoweldges this fact (2-32, 5-2), yet fails to recognize that experimental fishing can address this weakness by developing practices that can be exported internationally, and which might be adopted by foreign fishermen more readily than restrictive time and area closures. Therefore, the preferred alternative alone, by NMFS' own admission, will not accomplish its goal of recovering sea turtle populations. An alternative that incorporates some level of experimental fishing, however, does have the opportunity to accomplish recovery.	The EIS recognizes long-term solution will require a global effort.
P81u	written - Sean Martin	HLA believes that alternatives exist that will better achieve the goal of reducing impacts to listed species, while minimizing economic harm the Hawaii economy. This alternative consists of (1) implementation of a controlled, experimental swordfish fishery to obtain key information that can be used in this and other fisheries; (2) implementation of an adaptive management strategy that permits real-time management of incidental take and related impacts; and (3) implementation of an aggressive conservation strategy to conserve and protect sea turtles nesting beaches and other critical habitat areas.	The results of experimental fishing could be applied through adaptive management. Turtle nesting habitat conservation should be part of a comprehensive management strategy. Information has been added to the EIS to clarify these issues.
P81v	written - Sean Martin	(1) Experimental swordfish fishery: A significant obstacle to sea turtle recovery is the lack of information about the impacts of fishing gear on these species. The Hawaii swordfish fishery presents an excellent opportunity for NMFS to design and test experimental fishing protocols in a controlled fashion. Such protocols, once proven successful, could be applied in this fishery,	The long-term solution will require a global effort. The experimental fishery option has been described in more detail in the EIS.
P81w	written - Sean Martin	(1) and abroad where the overwhelming majority of take occurs. (Longline fishing effort other than Hawaii fishing accounts for 95.5 percent of the total fishing effort in the Pacific. 4-163.)	The EIS includes this information.
P81x	written - Sean Martin	(1) An additional benefit would be that Hawaii fishermen would be encouraged to remain in Hawaii as opposed to relocating to other, less regulated fisheries where turtle interactions may in fact increase.	Information on this possible benefit has been added to the EIS.

Tracking No.	Commenter	Comment	Response
P81y	written - Sean Martin	(1) HLA proposes that NMFS design an experimental fishing protocol for the swordfish fishery. All swordfish vessels would be subject to the requirements of this protocol. To insure strict compliance, NFMS should require 100 percent observer coverage in the swordfish fishery. Further, NMFS should establish an incidental take level which, if met, would permit swordfish fishermen to relocate to the tuna fishery if they so choose. Incidental take occurring in the swordfish fishery should be reported in real-time using existing VMS technology. A controlled fishery conducted in this way would provide an important source of scientific information, as well as minimize impacts to turtle species by producing exportable fishing technologies and cumulative effects associated with fisher relocation.	NMFS has considered this and other public comments, the alternatives in the Draft EIS, as well as the best available scientific information, in determining the preferred alternative in the Final EIS. NMFS is investigating a variety of measures to help increase sea turtle populations, to mitigate the population-level impacts of sea turtle mortality from longline gear interactions, and to collect data on sea turtle mortality that results from all the various types of pelagic fishing methods utilized in the Pacific Ocean by both domestic and foreign fishermen. NMFS plans to conduct research needed to develop gear technologies and fishing strategies for reducing sea turtle mortality resulting from longline gear interactions. This research may lead to new fishing methods that have much lower interactions with sea turtles than existing longlining techniques, and such technologies would be exportable to foreign longline fisheries.
P81z	written - Sean Martin	(2) Implementation of conservation measures: NFMS and other experts have recognized that the level of incidental take occurring in the Hawaii longline fishery is low, and does not significantly affect the likelihood of sea turtle recovery. (Charles Karnella, 16 Sep 1999; P Dalton, June 9 2000). Rather, NMFS has recognized that a key to sea turtle recovery is protection of nesting beaches and other key species habitats. To further the goal of sea turtle recovery, HLA and NMFS should work jointly to develop and implement mechanisms for funding specific sea turtle conservation projects. E.g., HLA could contribute money to a fund earmarked for beach restoration and conservation activities. HLA could likewise work with NMFS to secure funding for a variety of scientific research and other projects to further the recovery of these species. These conservation measures, taken in conjunction with reasonable management measures, will produce far greater sustainable benefits for these species than the preferred alternative.	NMFS has considered this and other public comments, the alternatives in the DEIS, as welongline as the best available scientific information, in determining the preferred alternative in the EIS. NMFS is investigating a variety of measures to help increase sea turtle populations, to mitigate the population-level impacts of sea turtle mortality from longline gear interactions, and to collect data on sea turtle mortality that results from all the various types of pelagic fishing methods utilized in the Pacific Ocean by both domestic and foreign fishermen. NMFS plans to conduct research needed to develop gear technologies and fishing strategies for reducing sea turtle mortality resulting from longline gear interactions. This research may lead to new fishing methods that have much lower interactions with sea turtles than existing longlining techniques, and such technologies would be exportable to foreign longline fisheries.

Tracking No.	Commenter	Comment	Response
P81aa	written - Sean Martin	Underlying assumptions for the suggested alternative. First to permit a meaningful experimental fishery to take place, NMFS would need to allocate an acceptable amount of incidental take to this fishery to enable a sufficient amount of trips. Further, remaining incidental take allocated to the tuna fishery would need to be sufficient to permit the relocation of swordfish fishermen if they choose to do so. Finally, for HLA to fund conservation measures, a sufficient amount of incidental take must be available generally to enable the tuna fishery to remain viable. HLA believes that conservation measures taken in combination with an experimental fishery must be considered by NMFS when establishing incidental take limits.	Information has been added to the EIS to industry's willingness to participate in an experimental fishery as evidenced by testimony received on the Draft EIS both at public hearings and through written submissions.
P81bb	written - Sean Martin	Of utmost concern to HLA is the proposed April through May closure of the entire Hawaii longline fishery. Such a closure is wholly unwarranted for the tuna fishery. As plaintiffs in the CMC v NMFS litigation recognized, the swordfish fishery, occurring primarily in northerly latitudes, accounts for about 87 percent of the sea turtle bycatch occurring in the longline fishery. Plaintiff's attorney P Atchitoff as well as NMFS supports this. This information clearly indicates that an April and May closure of the tuna fishery is not supported by the record, and will serve no purpose other than to inflict serious economic harm on the longline fishery.	Alternative 10, the new preferred alternative, allows year-round effort in the tuna sector of the Hawaii-based longline fishery.
P81cc	written - Sean Martin	Imposing such unwarranted and economically devastating measures on the tuna fishery may also seriously undermine HLA's efforts to work collaboratively with NMFS and other interested parties in devising conservation measures for listed turtle species. The DEIS fails to establish by evidence a relationship between the very limited impact of the Hawaii tuna fishery only and the necessity for an April through May closure of this fishery.	Alternative 10, the new preferred alternative, allows year-round effort in the tuna sector of the Hawaii-based longline fishery.
P81dd	written - Sean Martin	Indeed, the closure raises serious equal protection concerns because NMFS has failed to regulate or otherwise enforce the ESA with respect to other activities that have a far greater impact on sea turtle species (e.g. Hawaii recreational fisheries) than the Hawaii tuna fisheries.	Most protected species interactions with the Hawaii recreational fisheries occur in the territorial seas and are under the jurisdiction of the State of Hawaii.

Tracking No.	Commenter	Comment	Response
P82a	written - Hans Radtke	The DEIS purportedly includes estimates of the economic effects from the alternative actions considered for changes to pelagic fishery management. We conclude that the economic analysis fails to adequately show the economic effects. The DEIS does not present background information and analysis results in an acceptable professional manner for decision makers and stakeholders to understand the alternative action's impacts.	The analysis presents the available background information in significant detail. The assessment of alternatives is based on the best available scientific information and is presented in a manner that allows decisionmakers and stakeholders to understand the impacts. 0However, we have made changes to the text that should further clarify the analysis.
P82b	written - Hans Radtke	NMFS' draft guidelines for FMP economic analyze (NMFS, August 2000) were not followed. This means the procedural and analytical requirements of EO 12866 and the RFA were not met.	The draft guidelines were reviewed. A memo summarizing the suggested information requirements put forth in the draft guidelines and corresponding sections within the EIS is now included in the administrative record. Some text changes have been made.
P82c	written - Hans Radtke	The analysis results as stated in the DEIS are not easily understood and underestimate the economic effects of the alternative actions. Short shrift is given to the basic tenets of any economic analysis: risk and uncertainty, short term and long term profitability, and distributional consequences among fishery setors and fishery user groups, including a non-consumptive user group economic valuation (Edwards 1990).	NMFS believes the quantitative analysis goes as far as the reliability of the available data allow. The commenter's statement about underestimated economic effects appears to be related to the inaccurate statement that Type I multipliers were used. An assessment of risk requires detailed stochastic information on catch, effort, prices and costs. Such information was not available to the contractors nor would it have been practical to use. The uncertainty of outcomes under Alternatives 3, 5 and 7 was captured in the use of switching and non-switching scenarios, which provided upper and lower bounds of the effects of the alternatives. Estimates of profitability, whether short or long-term, were impractical and inadvisable given that the available cost data were collected in 1993 and did not provide reliable estimates of profitabilty (tuna vessels were estimated to lose money on every trip, yet they continue to fish). Distributional affects of the alternatives are summarized in Section 4.9. An entire section and appendix regarding non-consumptive uses of resources is provided in the EIS.

Tracking No.	Commenter	Comment	Response
P82d	written - Hans Radtke	Also, the primary measurement used to describe impacts was industry output rather than personal income and estimates of total employment. Output multipliers calculate how much money is "stirred up" in the economy, but do not mean that someone in the local area is making a wage or profit from this money. The differences between output multipliers and income coefficients are often confused, leading to misuse. Decision makers need to know and understand what type of multiplier or coefficient is being used in the assessment of the proposed changes.	Section 3.10.2 provides a detailed description of the types of multipliers used and their derivation. While output multipliers are often misused we believe the description in Section 3.10.2 provides sufficient clarity. Income and employment multipliers were not used because their use in conjunction with the output multipiers would have caused confusion. Instead we provided estimates of direct income and employment.
P82e	written - Hans Radtke	The static "break even" analysis presented in the DEIS does not adequately account for increased costs mandated by the changes in management. For example, the vessel budget will change to respond to significant additional cost items such as observer programs. Running costs will increase due to the area closures. Estimates bracketed by uncertainties for the differential costs should be included in the analysis.	Reliable cost information was not available for use in this analysis. Collection of reliable cost information sufficient to make useful estimates of the changes in costs that would be incurred was not possible. Furthermore, the model that was used was not developed to assess changes in travel costs, which may in fact decrease. Given these constraints, the breakeven analysis provides sufficient information with which to assess the impacts of the alternatives.
P82f	written - Hans Radtke	The alternative actions' economic effects should be presented in a way that net economic benefits are understood. We agree that data for a benefit and cost analysis is difficult to obtain, however qualitative discussion offered for analysis sorely lack the depth of explanation needed and expected to understand the economic burden from the alternative actions. Instead, the DEIS offers a confusing "break even" analysis with misused units-of-measurements for the results. The attendant changes to other fishery groups (recreational and non-consumptive) due to resource availability increases and decreases are not modeled.	The economic benefits of the alternatives are not clear. As pointed out in the Section 3.10.4 no estimates of the non-market valuation of turtles or seabirds are available. Reductions in turtle and seabird mortality are the primary benefits of the alternatives, and while these effects are noted in terms of numbers of animals saved, the full extent of the economic burden of the longline fleet to produce these savings is not clearly stated. Finally, the alternatives are not expected to create major changes to the other fleets. We do acknowledge that non-longline fleets may benefit from higher fish prices if the longline catches are reduced.
P82g	written - Hans Radtke	It was particularly disturbing that sound economic analysis methods were not used in the DEIS, because data was available to develop estimates of regional economic impacts. While a quantitative cost-benefit analysis to show consumer and producer surplus may not have been possible, we discovered relevant research information on fleet characteristics and fishery prosecution that would have allowed a more thorough regional economic impact analysis.	The analysis used the best available information in assessing cost and benefits. Available information on operating costs in the longline fleet was outdated and did not appear to produce reliable results. While the regional economic impact model was developed by using these data, Sharma's estimates were for the longline fleet as a whole and did not attempt to differentiate between swordfish fishers, mixed fishers and tuna fishers. It appears that the ability to use a higher level of aggregation mitigated the inconsistencies apparent when looking at data for specific sectors.

Tracking No.	Commenter	Comment	Response
P82h	written - Hans Radtke	In our attempt to follow the DEIS' economic effects methods, we developed our own regional economic impact model (REIM). Below we discuss our methodological approach and present our results. REIMs are based on an I/O description of an area's economy (Radtke 1987). The description approximates the area's economy by expressing economic relationships among economic sectors. The area economy may be a county, a city, a state, or any other boundary where sufficient data about the relationships exist. Economic relationships are measured by dollar values of purchases or sales among economic sectors. Each sector, such as the longline fishing sector, purchases goods and services from itself or other sectors and sells goods and services to itself or other sectors. The annual dollar values of these transactions provide the basic data for constructing the I/O model. These data are organized into a table called a "transaction matrix." The transaction matrix provides the information used to derive response coefficients and multipliers used to measure the importance of any activity.	A similar description of the I/O model used is found in Section 3.10.2. We believe that the Sharma model is the best available model for fisheries in Hawaii. We are familiar with the models developed by the commenter, and while they are generally accepted as providing reliable estimates for the fishery in which they have been through rigorous peer review.
P82i	written - Hans Radtke	The DEIS based their analysis on an I/O model completed by Sharma et al (1999) that accurately presents multipliers and response coefficients for Hawaii's fisheries and agricultural sectors. However, to describe the effects of longliner vessels, the DEIS only uses a Type I output multiplier. Type I multipliers exclude induced economic effects (Edwards 1990). They, in effect, only model the total impacts of purchases from supporting industries, and do not include the regional impacts of crew wages and net income that ripple throughout the economy. Type II multipliers are correctly used for the charter and recreational sectors (3-100). The estimated economic contribution from pelagic fishing is presented in terms of direct jobs and total output (3-101). This presentation again uses a modified Type I output multiplier for the commercial sector and the Type II multiplier for the recreational sector. The DEIS then uses these basic relationships to estimate the economic impact of the alternatives considered. The problem with their analysis is twofold. The first problem is in the use of total output multipliers. Economic impacts that affect communities should be displayed in terms of total personal income or jobs that may be affected.	The analysis uses Type II output multipliers developed by Sharma. Dr. Sharma has reviewed drafts of Section 3.10.2 and has indicated that we have correctly used his model results. Whether to use output multipliers or to use income or employment multipliers to estimate total effects is a decision that is left up to the analysts. Each type of multiplier has its advantages and disadvantages. In the case of the EIS, we chose to use the output multiplier because it is a measure that is often used by decisionmakers, and because we believed that significant complexities that develop with the very ratio the intermediate demand seen in the longline fishery could best be explained with the use of output multipliers.

Tracking No.	Commenter	Comment	Response
P82j	written - Hans Radtke	The second problem is their exclusion of induced effects for the commercial sector. Spending by households that receive income from the fishing industry has a real effect on communities that depend on these expenditures for the wellbeing. In the long run, a change in purchasing patterns wilongline be felt by suppliers of the fishing industry and by suppliers to households.	The model uses Type II multipliers. The estimated total output resulting from the longline fishery is lower than expected because of the relatively low proportion (49 percent) of the longline sector's output that is estimated by Sharma to contribute to final demand. This effect is explained in detail in Section 3.10.2. The text has been supplemented to further clarify the estimates of economic impacts.
P82k	written - Hans Radtke	We have used our own I/O modeling approach to estimate the amount of personal income generated by the Hawaii longline pelagic fishery. We calongline our model the Fishery Economic Assessment Model (FEAM). The FEAM includes available budgets for harvesters and primary processors to estimate the economic impact of the fishing industry. In I/O jargon, the fishing sector is disaggregated into specific harvesting and primary processing modes.	The FEAM models are an alternative method of producing estimates of total economic impact of management actions. The FEAM are based on IMPLAN which is an Input-Output Model that is calculated and calibrated on a nationwide basis. In general IMPLAN and the FEAM models are useful tools, and their use would have been recommended if the Sharma model was not available. The Sharma model was explicitly developed to estimate fishery impacts in Hawaii. It is based on fishery expenditures that were estimated from surveys of Hawaii-based fishers and reviewed and developed by Hawaii-based economists. The results projected by the FEAM are analogous to the results provided in the EIS. There are likely to be differences because of aggregation levels, and because of varying degrees of the two model's ability to capture relationships within the economy.
P82l	written - Hans Radtke	The FEAM relies on the most recent State of Hawaii IMPLAN model to generate multiplier coefficients for the harvester and processor expenditure categories. The expenditure categories are for crew and worker wages, fuel and oil, supplies etc. The basis for disaggregating the expenditure patterns is our past information about the Hawaii longline fleet and the study by Hamilton et al (1996). The budgets are also shown in the DEIS (3-172).The results of the FEAM analysis are displayed in terms of long term total personal income and jobs created by the Hawaii longline fishery. The impacts are also displayed in terms of the difference between the status quo and other considered actions. Short term impact analysis results are included as an attachment.	

Tracking No.	Commenter	Comment	Response
P82m	written - Hans Radtke	We relied on our knowledge of the processing industry to include a $0.65 per round pound primary processing margin. This includes labor for washing, packing, etc. and general plant overhead. In order to convert this to ex-vessel revenues by species types, we used the 1993 [1998 - probable typo] price per landed pound averages.	This statement reveals some of the differences in IMPLAN/FEAM compared to the Sharma Model. Primary processing of fishery output in Hawaii is not a significant industry. The costs of cleaning, washing and marketing fish to wholesalers are paid by fishers to the auction house and as such are included in the expenditure estimates produced by Hamilton *et al.* (1996). Adding an additional $0.65 margin double counts these expenditures and will tend to produce higher estimates of total economic activity. This result underscores the importance of using existing information that was developed specifically for Hawaii. Forward linkages in the Hawaii economy from the fishing industry developed in Sharma *et al.*(1999) are estimated to add an additional $4 million in direct margins to and $6 million worth of total direct indirect and induced output to Hawaii's economy. We have added text that discusses these forward linkages.
P82n	written - Hans Radtke	The purchase patterns of harvesters and primary processing from the Hawaii longline fishery were modeled for the eight alternatives under two separate scenarios. The first scenario accepts the assumptions of the DEIS. That is, that the vessels will return to "break even" point in the long term. These disaggregated purchases are then multiplied by the appropriate IMPLAN based sector total income coefficients. The results, in terms of total personal income generated by fishing under the alternatives modeled, are displayed in Table 1. Total personal income in the region may decline by as much as $17 to $39 million under the preferred alternative (Alternatives 7A and 7B). This is equivalent to a loss of 693 to 1551 full-time equivalent jobs.	The Sharma model generates different estimates, that preclude double counting that often occurs with the misuse of input-output models. Estimates of the changes in total economic output and changes in direct employment and income, as well as direct changes in input purchases are included in the EIS for each scenario and alternative analyzed. For Alternative 7, reductions in total economic output range from $10 to $22 million.

Tracking No.	Commenter	Comment	Response
P82o	written - Hans Radtke	The second scenario models the increased costs associated with increased running time and other increased costs that may be included in the alternatives. Also included in these scenarios is the income that is available to crew members from shark finning under the first three alternatives. In the short term, boats will not have time to adjust to increased costs and reduced available resources. A result may be that a negative return may bring money into the industry. The region may actually experience a short-term increase in economic activity and therefore a shift of personal income from savings and increase in debt to purchases for boat activities. But this is not expected to last. The second scenario models the fleet that has adjusted to the break even point that was assumed in the DEIS. With costs increasing, and profit staying even the total gross revenues per boat increases. This is at the expense of a number of boats that will be removed from the fishery in some of the alternatives. With other alternatives, the number of boats may actually increase as they switch from one type of fishing to other types.	The commentors assume that running time will increase under the alternatives. While the model developed by Kobayashi and Polovina does not produce an estimate of mean distances to fishing grounds, an examination of the alternatives indicates that closed areas will be more distant than the areas that remain open meaning that running times will be reduced rather than increased, particularly if the vessels continue to fish out of Hawaii. The EIS does include estimates of other fixed costs necessary to comply with the alternatives including the costs of purchasing and installing line-shooting equipment. The second scenario suggested by the commenter assumes that gross revenues per vessel increase. We see no basis for this scenario at least as explained.
P82p	written - Hans Radtke	As the fishing industry adjusts to greater costs associated with increased running time and reduced profitability, some boats will go out of business. In order to return to the "break even" point of profitability, there is a reduction in swordfish boats and an increase in smaller tuna boats. Once this has happened, the amount of total personal income that is associated with the harvesting and processing of the Hawaii longline fishery is estimated to range from \$25 million to \$45 million under the preferred alternative. This represents a loss of 1012 to 1819 jobs.	While the analysts do not believe that the running cost increases envisioned by the commenter will occur, we do indicate that vessels that switch from swordfish fishing to tuna fishing will experience lower catches per unit effort and will have difficulty covering costs with the larger and faster vessels typically employed in the swordfish fishery. We do not have sufficiently detailed cost information to quantify how many vessels will switch to tuna fishing and whether they will be financially viable. Making such quantitative projections without adequate data becomes speculative, and would not be appropriate for inclusion in an EIS.
P82q	written - Hans Radtke	Our analysis only includes the alternatives developed in the DEIS. The DEIS may not have included other alternatives that could have been developed based on a more complete understanding of the Hawaii fishing sector impacts on the region's economy. By including both the direct impacts and jobs, as well as indirect and induced impacts, an overall impact of the proposed actions to minimize interactions with sea turtles in this area may be included. Affected are not only those industries that sell supplies and services to these boats, but also the people that work in the processing plants that prepare these fish for export or for local distribution. Others that work in supporting industries or in the general economy, such as a grocery checker in the local supermarket, will also realize changes in their income resulting from proposed alternatives.	The analysis includes estimates of direct, indirect, and induced economic effects, as well as estimates of direct effects on supply sectors, and impact on protected species for a full range of alternatives.

Tracking No.	Commenter	Comment	Response
P82r	written - Hans Radtke	Because of an incomplete understanding of the impacts on the region's economy, the DEIS may not have included an appropriate range of alternatives. The overall impact of the proposed actions should not only include direct income and jobs, but also indirect and induced impacts. Affected are not only those that crew on these boaters, but others that may work in supporting industries. Grocery store clerks in the local market and professional accountants hired by fishing industry businesses will also realize changes in their income resulting from the proposed alternatives. Because of the inherent flaws in the offered descriptions of the economic effects, we believe the procedural and analytical requirements of EO 12866 and the RFA are not being met.	We believe that the analysis provides sufficient information for reasonable reviewers to differentiate between the alternatives and to make judgements as to their relative effectiveness. The information guidelines developed in the NMFS Draft Guidlines for FMP economic analysis (NMFS, August 2000) were reviewed, and to the extent practicable, they were followed by the analytical team. Additional analysis may be required for any FMP amendment or regulatory action.
P83a	written - Gerald Winegrad (ABC)	[American Bird Conservancy] We are primarily concerned that any management strategy adopted for the U.S. pelagic fishery in the WPR and the FEIS include effective measures to eliminate or at least reduce by at least 95 percent the incidental catch of seabirds in the Hawaii longline fishery.	Decrease of albatross bycatch by 95 percent could not be accurately determined in the future because existing bycatch data is of questionable reliability.
P83b	written - Gerald Winegrad	We think the discussion at p3-113(a) of the DEIS should be deleted, wherein the IUCN listing [of the Black-footed Albatross as Vulnerable in 1998] is contested.	There was no intention to question the listing. Language has been added to the FEIS to clarify this issue.
P83b	written - Gerald Winegrad	We note that the DEIS appears to focus on sea turtles and is driven by the Federal District Court's decision, including the hurried completion schedule of 1 April 2001. Much of the discussion seems to minimize the seriousness of the seabird bycatch problem. Estimates of mortality in longlines is minimized, population data is used that selectively chooses years to indicate increases rather than using the longest data sets indicating declines, very little discussion is included of the endangered Short-tailed Albatross, terms of the 29 November BO are not included, and seabirds are excluded from alongline discussion under Option A at pp2-16 to 2-19.	The EIS includes additional information on the short-tailed albatross and the STAL BO.

Tracking No.	Commenter	Comment	Response
P83c	written - Gerald Winegrad	Mitigation measures to avoid seabird mortality should be detailed. We completely support Alternative 7's provision that all longlines must be set so that the deepest point between any two floats is deeper than 100m. This would assist in reducing seabird mortality as most seabirds are killed in the shallow sets of swordfish and mixed set longlining (3-106(a)). It is imperative that this measure be adopted and if not, the closure in Alternative 8 should be seriously considered. We also support the closure of all longline fishing in April and May, which although done because of sea turtle interactions, will have some benefit for seabirds as well.	Mitigation measures to avoid seabird mortality are detailed in the EIS.
P83d	written - Gerald Winegrad	The DEIS does not outline other adequate measures to be employed on board longline vessels to avoid the killing of protected seabirds, including the endangered Short-tailed Albatross.	Incorporation of discussion of the STAL BO requirements in the EIS includes handling measures to avoid the killing of short-tailed albatross.
P83e	written - Gerald Winegrad	We do not support such a "pick any two" menu approach that the WPRFMC adopted and that was published as a proposed rule by NMFS. This is a flawed approach, it has not worked well in Alaska, and will not work in Hawaiian waters. We were clearly told by Council staff when we expressed concerns over the menu approach that "preliminary discussion leads me to believe that the regulations will not be a menu selection but mandated." Except for the enforced line setting of Alternative 7, other mitigation measures continue the current Council positions.	Alternatives in the EIS incorporate mandated mitigation measures established in the STAL BO.
P83f	written - Gerald Winegrad	These mandatory terms and conditions from the BO [blue dyed and thawed bait, line setter with 45g weight attached within onem of hook, line shooting faster than vessel speed, strategic offal discharge] are already mandatory for alongline deep sets, and should be incorporated for shallow sets under any alternative.	Alternatives in the EIS incorporate mandated mitigation measures established in the STAL BO.
P83g	written - Gerald Winegrad	Should the longline fishery continue, we also would support the use of paired bird scaring lines on alongline longline vessels as these have proven to be extremely effective in other fisheries, such as Alaska's groundfishery (9f4% reduction, Melvin et al 2000).	Alternatives in the EIS incorporate mandated mitigation measures established in the STAL BO.
P83h	written - G Winegrad	The use of C hooks to replace J hooks should also be required.	Alternatives in the EIS incorporate mandated mitigation measures established in the STAL BO.

Tracking No.	Commenter	Comment	Response
P83i	written - Gerald Winegrad	All of these mitigation measures should be obligatory on Hawaii longline vessels fishing North of 23° N latitude and regardless of whether fishing in the EEZ or beyond, just as required under the FWS BO. The proposed NFMS regulations on mitigation measures suggested by the Council apply only to above 25° N latitude and note that only 33 percent of the average annual fleet effort occurs above 25° N latitude.	Alternatives in the EIS incorporate mandated mitigation measures established in the STAL BO.
P83j	written - Gerald Winegrad	Adequate observer coverage should be detailed in EIS. We are at a loss to explain the absence of any observer coverage mentioned in any of the alternatives. Clearly, such a limited percentage of both trip coverage [ten percent for tuna and three percent for swordfish] and setting and haulback coverage is unacceptable. The FWS BO requires five percent observer coverage on all longline vessels in 2003, beginning with 1% in 2001. These FWS mandated observers would be provided by NMFS and primarily tasked with observing Short-tailed Albatrosses and other endangered species interactions during sets and haulbacks. All seabird interactions would be observed. We urge that observer coverage be at a 30 percent rate to detail seabird and sea turtle interactions and mortality and the effectiveness of the avoidance measures.	The EIS incorporates and discusses the requirements of the STAL BO as it relates to observer coverage.
P83k	written - G Wine-grad	A fee system, as exists in Alaska, could be implemented to help pay for these observers.	Discussion of the Alaska fee system approach has been included in section 4.10 of this EIS.
P83l	written - Gerald Winegrad	Emphasize seriousness of Hawaii longline seabird mortality. We are concerned that the DEIS concentration on sea turtles and its quick production in response to the requirements of Judge Ezra have compromised the seabird aspects of the DEIS. We urge the writers of the FEIS to re-write sections of the DEIS to more accurately reflect the serious threat that Hawaii longline presents to short-tailed, black-footed and Laysan Albatrosses.	The EIS has been revised to include more information on the potential effects of bycatch, especially on short-tailed albatross.

Tracking No.	Commenter	Comment	Response
P83m	written - Gerald Winegrad	The DEIS includes detailed discussions of each species of sea turtle affected as well as charts on these species. For seabirds, all are lumped together and there is one column for all seabirds on the charts of the alternatives' impacts. We suggest that short-tailed albatross be considered separately. The detailed provisions of the BO outline the risk that the Hawaii longline fishery poses to the endangered Short-tailed Albatross. Despite the endangered status of this seabird and its limited breeding areas and total population of about 1200 animals, the DEIS does not discuss details of the potential impacts on this species and fails to utilize data and analyses in the recent BO.	The EIS will be revised to include information provided in the STAL BO.
P83n	written - Gerald Winegrad	The DEIS does not discuss the mandatory Terms and Conditions of the BO to eliminate or minimize the take of Short-tailed Albatross by the Hawaii longline fishery or to monitor the level of take.	The EIS has been revised to include discussion of the required Terms and Conditions of the STAL BO.
P83o	written - Gerald Winegrad	p 3-109(a) "NMFS observer data show that fishery/seabird interactions regularly occur between the Hawaii longline fishery and two species of albatross: BF and LA. There have been no reports of interactions ... could change in the future as the short-tailed albatross population continues to increase." With the limited NMFS observer coverage cited above, we suggest that paragraph be changed and reflect the sightings of Short-tails around Hawaii longline vessels and that, even though mortalities have not been recorded, this does not imply they have not occurred and they may still occur.	The EIS has been revised to include more information on short-tailed albatross interactions with the Hawaii-based longline fleet.
P83p	written - Gerald Winegrad	We recommend that the EIS include a detailed discussion of the Short-tailed Albatross' population biology and vulnerability to longlining mortality using data and analysis from the BO and include the mandatory terms and conditions and conservation recommendations in the preferred alternative and in its analyses of alternatives. The DEIS is deficient in not discussing these provisions above for the Short-tailed Albatross. Potential impacts to this endangered bird need to be included in all proposed alternatives. This should be rectified.	The EIS incorporates pertinent information from the short-tailed albatross BO, including potential impacts.
P83q	written - Gerald Winegrad	In the chart on page ES-11 and throughout charts in the DEIS analyzing alternatives, the Short-tailed Albatross should have a separate column, as do sea turtles. The E.S. at pES-6 also fails to discuss the Short-tailed Albatross population and the impact of the fishery on it.	The E.S. in the EIS has been revised to reflect the enhanced concern and additional available information regarding short-tailed albatross.

Tracking No.	Commenter	Comment	Response
P83r	written - Gerald Winegrad	Seabird population and mortality data revisions are needed. We disagree with a basic tenet of the DEIS that "For purposes of this EIS, NMFS has elected to provide and use the statistical analyses that result in lower take estimates, and corresponding overall reduced estimated impacts, especially for Black-footed Albatrosses" (p3-105(a)). Under the precautionary principle supported by the U.S., we should base decisions on species on the conservative side of conservation and use the higher estimates. Therefore we urge the FEIS to use the higher estimates for albatross mortality from the non-log transformed data.	Statistical treatments of observer data have been revised to reflect all the alternative analysis outcomes, including worst case scenarios.
P83s	written - Gerald Winegrad	We disagree with p2-32 that "these average annual incidental catches represent about .6 percent and .06 percent of the estimated BF and LA albatross populations respectively." This is based on underestimated annual mortality data and rates. Many hooked seabirds fall from the hooks before they are retrieved on deck. Reported mortality can be underestimated by 30-95 percent (Gales 1998). Any mortality figures should be presented as minimums and Gales should be cited to substantiate that the mortality numbers may be nearly double that cited. The FEIS should establish a method and discuss the determination of a rate for dead seabirds that fall off of longline hooks.	Varience in possible mortality rates is discussed in the EIS.
P83t	written - Gerald Winegrad	At p3-105(a), we also recommend better use of population data. The DEIS is presenting a skewed picture of albatross populations in picking time frames indicating increases in certain populations of albatrosses. For example, Midway Atoll, Laysan Island, and French Frigate Shoals represent 75 percent of the breeding population of BF Albatross. From 1992-2001, the breeding pairs on these islands have declined from 48413 pairs to 43781 pairs, a decrease of nearly 10%. For Midway Atoll, the numbers declined from 1992-2001 from 19,757 breeding pairs to 18,493; at French Frigate Shoals, from 3926 pairs in 1980 to 3899 in 2001. See charts from Flint (FWS) 2001. This is quite a contrast from the statements at p3-105(a) of the DEIS that "FWS census data suggests that during the last decade the number of breeding pairs of BF albatross in nesting colonies in the NWHI has increased by eight percent." The same is true for the selective use of data to show increases in the Midway and French Frigate Shoals populations. The figures for LA Albatrosses cited also should reflect the longest period of the data set and these clearly show a substantial decline.	The Draft EIS and Final EIS discuss weaknesses in all existing data sets, including those for NWHI breeding albatrosses. Data interpretation has been revisited.

Tracking No.	Commenter	Comment	Response
P83u	written - Gerald Winegrad	Assess albatross mortality in nests due to parent mortality. The DEIS should assess nestling mortality when a parent albatross is killed or severely injured from a longline hook. The DEIS recognizes such mortality at p3-122(a) but no data is presented. Each albatross pair has only one egg and, if hatching is successful, one chick to care for. The unfledged young are wholly reliant on parents for sustenance and the death of one parent usually means the nestling will not survive to fledge. Further, since the albatrosses pair for life and mate and produce only one egg a year, the death of an adult means the mate may not breed again for two years or more. Any analysis of population effects of killing adult albatrosses during breeding season should include this added mortality factor and depressed reproductive cycle.	The Final EIS discusses potential population effects of the loss of adult albatrosses that may have nests with eggs or chicks.
P83v	written - Gerald Winegrad	Support for protected species workshops for alongline owners and operators of Hawaii longline vessels. The BO requires such workshops.	Such workshops are a part of the preferred alternative.
P83w	written - Gerald Winegrad	We suggest that all crew members be required to attend as well and that these sessions be held jointly with the FWS. However, these workshops should not be seen as alternatives to meaningful mandatory avoidance measures to end the killng of seabirds. In the past NMFS and the Council have promoted education and outreach to the fishers without any success in avoiding seabird mortality. Nothing changed in fishing practices that anyone can discern.	The EIS has been revised to include discussion of the required Terms and Conditions of the short-tailed albatross STAL BO.
P83x	written - Gerald Winegrad	Recognition of special duties of U.S. to eliminate seabird mortality. The U.S. is under special trust and international leadership responsibilities to end seabird mortality in longline fisheries. In addition to the ESA, MBTA, NEPA requirements, NOAA's own operating principles dictate that bycatch be minimized. Intlially, the DEIS barely touches on the FAO International Plan of Action - Seabirds, and the U.S. NPOA for the Reduction of Incidental Catch of Seabirds in Longline Fisheries near completion at NMFS.	The EIS has been revised to reflect additional available information relating to seabird protection initiatives.

Tracking No.	Commenter	Comment	Response
P83y	written - Gerald Winegrad	The DEIS notes that fishing mortality by other nations may affect the Northern Hemisphere albatrosses and some of the alternatives under consideration in the DEIS may displace the fishing fleet elsewhere. This rationale should not be used to lessen efforts to stop the kilonglineing of albatrosses and other seabirds on Hawaii-based longlines. As noted in the DEIS 96 percent of the BF Albatrosses breed in the NWHI as do 99 percent of the world's LA Albatrosses. Also known to forage around and follow Hawaii longline vessels is the Short-tailed Albatross. This alone places the Hawaii fishery at the center of the need to adopt meaningful measures to protect these birds.	The EIS has been revised to include more information on short-tailed albatross interactions with the Hawaii-based longline fleet.
P83z	written - Gerald Winegrad	Scientists have documented an urgent necessity for actions to be taken covering alongline the world's longline fleets on all the world's oceans to prevent a collapse in seabird populations. The FAO Intl Plan of Action - Seabirds is a first step to gaining the cooperation of each longlining nation to end the unnecessary slaughter of seabirds. The U.S. has a unique oportunity to lead by example on this issue and nothing serves as a better model than setting an example in eliminating seabird mortality in our own fisheries. The U.S. delegation to the FAO consultations in Rome took strong, decisive positions on the negotiations, but many of the U.S. positions are not complied within our own fisheries in Hawaii and Alaska. The FEIS should carefully examine the U.S. positions taken by the State Dept. of Commerce/NOAA/NMFS and FWS and comment on compliance in the EIS. I can attest to the need for U.S. leadership by example in Hawaii and in Alaska to end the mortality so as to gain the support of other longlining nations.	The EIS has been revised to reflect additional available information relating to seabird protection initiatives.
P83aa	written - Gerald Winegrad	As part of this leadership, the U.S. has obligations under migratory bird treaties with Canada, Mexico, Russia and Japan. Our country needs to fully enforce the MBTA concerning seabird mortality in the Hawaii longline fishery.	NMFS is committed to fulfilling its international obligations relating to protected species.
P84a	written - Kitty Simonds (Council)	Chapter 1: Well written and informative. 1-18 Table 1-3 The number of active vessels (24) differs from the numbers of permits (40) and vessels (68) on page 2-24	Twenty-four vessels were active in 2000 of 68 holding general longline permits on July 15, 2000. In 1998, 40 vessels had general longline permits.
P84b	written - Kitty Simonds	1-21 May wish to add FCMA to the list of Acronyms	The acronym has been added to the EIS.

Tracking No.	Commenter	Comment	Response
P84c	written - Kitty Simonds	1-26 The numbers of BF and LA albatrosses noted is inconsistent with the numbers reported in Table 2-2. Also, need to update paragraph on the issuance of the FWS BO (issued Nov 28 [29?] 2000).	The STAL BO was not available in time for inclusion in the Draft EIS. These numbers have changed and the estimates for 1998 from the BO are included in the EIS. Reference to the publication of this BO is also inserted in revisions. The number on page 1-26 is an average of six years of data in Table 2-2.
P84d	written - Kitty Simonds	1-29 Section 1.6 May want to also include the FMP measures to reduce the incidental catch of seabirds.	Included.
P84e	written - Kitty Simonds	Chapter 2: well written and informative, except for the tables presented on pp 2-45 to 2-49. These tables are inaccurate and need attention.	The tables have been revised in the EIS.
P84f	written - Kitty Simonds	Punctuation marks need attention as there are many periods that are missing.	General proofreading and editing have been accomplished for the EIS.
P84g	written - Kitty Simonds	2-3 Section 2.1. Midway is under the management of the FWS, and Palmyra and Kingman Reef may also be managed by them in the future.	Information has been added to the EIS to define the shoreward boundaries of the EEZ. At Midway and other NWR, the EEZ extends to the shore because there is no territorial sea.
P84h	written - Kitty Simonds	2-19 Section 2.2.10. Document states that declines in albacore catch by longline fisheries in American Samoa and Samoa may reflect local reduced densities. If there are other possibilities what would they be?	Information has been added to the EIS to indicate that inter-decadal shifts in ocean climate are another possible contributing factor.
P84i	written - Kitty Simonds	2-21 Objective 8 in Section 2.3.8 is not listed here.	Objective 8 is stated in FMP, but it is an EIS objective.
P84j	written - Kitty Simonds	2-33 See pp 4-17 and 4-47. Inconsistency with the numbers of mortalities reported for LA and BF albatrosses. Perhaps values on 4-47 should be used throughout the document as they were used in the analysis. Comparison to other fisheries would be interesting. Cite Cousins and Cooper (eds), 2000, not Cousins et al, 2000, for the last sentence of first paragraph.	The inconsistency has been eliminated in the EIS and the citation corrected.
P84k	written - Kitty Simonds	2-41 Check the values in Table 2-9 as they have been updated by M McCracken of the NFMS Honolulu Lab. This update is available from the Council's framework adjustment to the Pelagics FMP on measures to reduce the incidental catch of seabirds.	The information has been updated in the EIS.

Tracking No.	Commenter	Comment	Response
P84l	written - Kitty Simonds	2-46 Alternative 2. Table does not consider the fact that the use of line-setting machines, blue-dyed bait and night setting in the seabird measures could also lead to a reduction in sea turtle takes. For comparative purposes and to be consistent, an estimated reduction in these takes need to be included for Alternative 2.	Information has been added to the table in the EIS.
P84m	written - Kitty Simonds	2-47 Alternative 2. The “potential adverse effects for seabird take” is incorrect. The Council actions to reduce the catch of seabirds in the Hawaii longline fishery is expected to reduce seabird catch by up to 97 percent.	Information has been added to the table in the EIS.
P84n	written - Kitty Simonds	3-109 Table 3.7-1 The values in this table differ with the values presented in Table 2.2.	The inconsistency has been eliminated in the EIS.
P84o	written - Kitty Simonds	3-110 Note that in Dec 2000, a new breeding pair of short-tailed albatrosses was just found on another island near Japan: Yomejima Island, a deserted island located southernmost among the Mukojima Islands, as part of the Ogasawara Island chain.	Comment noted.
P84p	written - Kitty Simonds	3-111 Table 3.7-2 Year 1999-1997 should be 1996-1997	Addressed in EIS.
P84q	written - Kitty Simonds	3-120 Section 3.7.22 Spacing between values and percent. Please note the citation for the statement that LA albatrosses consume more plastic than BF albatrosses. Also, note that one reason LA albatrosses consume high amounts of plastic is that the birds forage in a different area of the Pacific (near the “great garbage patch, a massive ocean gyre system to the east of Oregon and Washington”) and target different prey. BF albatrosses have more fine netting in their boluses, whereas the Laysan albatrosses have large and long plastic items. Also it appears that LA albatrosses target items that are red over items that are blue or green (you can cite Kinan and Cousins 2000). With regards to impacts on the population, the document should reflect that adult albatrosses are also impacted by plastic ingestion, in that they could be more exposed to harmful toxins (i.e., PCBs), and that they must exert more foraging time to obtain more nutrients. This could impact the population, as more adults would be forced to take more years off breeding for molting and care of their own feathers. These comments could also apply to Section 3.9.7.	Comments noted.

Tracking No.	Commenter	Comment	Response
P84r	written - Kitty - Simond	3-132 Section 3.9 Contaminants. Suggest a section on PCBs. Currently, PCBs are impacting seabirds, turtles and HI monk seals, as welongline as the fisheries around Tern Island, French Frigate Shoals. The FWS is preparing an EA to build a seawalongline, most likely to contain the PCBs while it is removed. Stilongline, the presence PCBs while it is removed. Stilongline the presence of PCBs could be impacting the coral reef, fishes, turtles, birds and seals immediately surrounding Tern. PCB contamination can make some animals lethargic, and perhaps more vulnerable to being incidentally caught on fishing gear.	Comment noted, paragraph re-written to reflect additional input on PCB contamination at Tern Island.
P84s	written - Kitty Simonds	3-178 Reference for tables should be Appendix G, not Appendix D. Also, it may be helpful to put estimated mortalities for the heading of Table 3.10-L22.	Recommended changes made to Tables 3.10.3-12 and 22
P84t	written - Kitty Simonds	3-179 Table 3.10-Longline23. Table inconsistent with Table 2.2	Inconsistency has been resolved in the Final EIS.
P84u	written Kitty Simonds	3-180 Figure already shown on pp 3-108(a).	We believe that the table is useful in both locations.
P84v	written Kitty Simonds	With the exception of Sections 4.6, 4.11, this chapter is generally well written and very informative. Section 4.11.9.5 is especially interesting.	Comment is an opinion. No response required.
P84w	written Kitty Simonds	A lot of information is presented in Chapter 3 on trolling, charter and recreational fisheries targeting pelagic sepcies, but to a large extent the evaluations in Chapter 4 ignore these fisheries. Some effort should be given to consider these other fisheries and their overall impacts, there must be some impacts; to the environment (note that Section 4.8 acknowledges why the analyses only concentrated on the Hawaii longline fishery.)	The EIS reflects the relative importance of the Hawaii-based longline fishery within the Pelagics FMP-managed fisheries in the Western Pacific Region. It also responds to the practical goal of complying with the Court-ordered delivery of an EIS focused on that fishery. NEPA is structured to encourage analysis of issues that are ripe for decisionmaking. Where such issues have not yet emerged, development of alternatives is merely hypothetical. In this case, there are no prohibitions that apply to any other specific pelagic fishery in the region, nor are there reporting and recordkeeping requirements, or even requirements for federal permits, for any other specific pelagic fishery. Where specific issues are apparent, such as the potential gear conflict issue in American Samoa, alternatives have been developed.
P84x	written Kitty Simonds	4-3 Section 4.2.1 Last sentence - If there was a large regime shift such as an El Nino in 1999, could this have a bearing on a lot of the data, especially population numbers or trends presented for 1999 (i.e. sea turtle foraging positions, seabird breeding pair counts, etc. ...).	The analysis of the effects of climate fluctuations on these components of the ecosystem have not been completed.

Tracking No.	Commenter	Comment	Response
P84y	written Kitty Simonds	4-12 Alternative 2. Document should also discuss the consequences of fishermen using seabird deterrent methods on sea turtle takes.	Due to the lack of reliable data, quantitative analysis is not possible.
P84z	written Kitty Simonds	4-15 Section 4.6. This entire section could be much improved. Certainly, some of the unreliability in the seabird catches make the evaluation difficult, but still, the Hawaii NMFS observer data are some of the best seabird incidental catch data available today and some detailed evaluation can be made. The authors should read the Council's document on measures to reduce the incidental catch of seabirds, or contact our office for assistance.	The reference document has been evaluated for the EIS.
P84aa	written - Kitty Simonds	4-17 Second paragraph. It is unnecessary to use figures from New Zealand for seabird mortality, except for comparative interest, when values are given on p4-47. Also, see p2-33 Alternative 3, second paragraph, the values given for the estimated reduction in seabird interactions are incorrect. According to Table 2-8 the values are BF 83-98 percent and LA 40-97 percent.	Addressed in EIS.
P84bb	written - Kitty Simonds	4-119 4th paragraph. Vessels may also be fishing near or relocating to Mexico as mentioned on p 4-173.	The vessels may be fishing in a number of different locations, but the information available suggests that the majority of displaced vessels are based in California.
P84cc	written - Kitty Simonds	4-156 Section 4.11 As a suggestion, the authors may want to separate the direct and indirect effects from Section 4.11, presenting them earlier in Chapter 4. This may make it easier for the reader to follow. After presenting the direct and indirect effects, then present the cumulative effects (cumulative effects are effects of any other actions or activities that can also impact the affected environment), followed by an overall summary. Also, the listing of the alternatives is repeated with little discussion of how the effects in combination (direct, indirect, cumulative) relate to the alternatives (i.e., what are the total effects?)	Cumulative effects, as defined by the CEQ, are the total effects, including both direct and indirect effects, on a given resource, ecosystem, or human community. To describe cumulative effects, direct and indirect effects must be discussed in the context of exogenous factors, and thys it facilitates understanding of the cumulative effects must bediscussed in the context of exogenous factors, and thus it facilitates understanding of the cumulative effects to combine then discussion with that of the indirect effects.
P84dd	written - Kitty Smionds	4-159 Section 4.11.2.1.3 Vessel Groundings. Vessels other than vessels covered by the FMP are considered here, but some vessels covered by the FMP have grounded in the NWHI, for instance, and should be covered in direct effects.	This section includes impacts of all vessels, regardless of origin.
P84ee	written - Kitty Simonds	4-159 Section 4.11.2.1.4 Marine Debris: most debris is from fisheries other than the Pelagic fisheries considered in the DEIS, but some debris does come vessels under the FMP, such as lightsticks and some longline gear.	The amount of debris generated by the Hawaii-based pelagic fisheries is insignificant in comparison to that of the North Pacific trawl fisheries.

Tracking No.	Commenter	Comment	Response
P84ff	written - Kitty Simonds	4-160 Section 4.11.2.2 Direct Effects (See comments for p4-159). The grounding of a vessel offshore of Rose Atoll is an exogenous effect as it is a vessel (Asian longline vessel) not covered by the FMP.	This section has been modified to clarify that the Asian vessel was not operating under the Pelagics FMP.
P84gg	written - Kitty Simonds	4-161 Section 4.11.2.3 No explanation is given to what these effect are or why their impact would be minimal.	These impacts are already listed in Section 4.2.2.
P84hh	written - Kitty Simonds	4-167 Section 4.11.4.1.1 Heading should read, "Harvesting Effects" not "Fishing Effects."	Section 4.11 has been revised, and this heading no longer appears.
P84ii	written - Kitty Simonds	4-169 3rd paragraph. Recreational take of turtles is a direct effect not an exogenous effect, unless it was recreational fisheries not covered under the FMP.	The take referred to is by recreational shore fishing, not pelagic fishing; hence, it is exogenous.
P84jj	written - Kitty Simonds	4-173 Section 4.11.4 May want to include discussion regarding American Samoa closure to vessels greater than 50 ft. How does this impact sea turtles?	Agree - text added to reflect comment.
P84kk	written - Kitty Simonds	4-177 Section 4.11.5 Could include a discussion on contaminants (i.e. PCBs, lead ingestion, oil spills, etc.)	Discussion of contaminants discussed elsewhere.
P84ll	written - Kitty Simonds	4-179 Section 4.11.5.3 Note that the coasts of Washington, Oregon and California are historical foraging grounds for the endangered short-tailed albatross, as described in the literature. Also, no discussion of the Alaska fisheries, or Canadian fisheries is given.	Addressed in EIS.
P84mm	written - Kitty Simonds	4-186 Figure 4.11-1. Note that there should be arrows pointing back from other Hawaii pelagic fisheries to protected species. In fact, this discussion is minimal in Chapter 4, and perhaps could be enhanced.	Comment noted.
P84nn	written - Kitty Simonds	Chapter 5 is well written and informative. 5-5: note that the coasts of Washington, Oregon and California are historical foraging grounds for the endangered short-tailed albatross	Information has been added to the EIS.
P84oo	written - Kitty Simonds	7-13 Please note that "Cousins et al in press" is now "Cousins et al 2000". Remove Cousins et al no date.	Changes have been made to the EIS.

Tracking No.	Commenter	Comment	Response
P84pp	written - Kitty Simonds	Cousins K., P. Dalzell, E. Gilman. 2000. Managing pelagic longline-albatross interactions in the North Pacific Ocean. Information paper presented to the Second International Conference on the Biology and Conservation of Albatrosses and other Petrels, Honolulu. 10 p. Kinan I. and K. Cousins. 2000. Abundance of plastic debris and ingestion by albatross on Kure Atolongline, Northwestern Hawaiian Islands. Submitted as a poster to the Second International Conference on the Biology and Conservation of Albatrosses and other Petrels and the International Marine Debris Conference. Held in Honolulu.	References have been added to the EIS.
P84qq	written - Kitty Simonds	NMFS making fishery policy. The proposed alternative is brutal. It may achieve the desired reduction of turtle takes but does not offer any prospect of saving swordfish or mixed (swordfish/tuna) fishing in Hawaii. Indeed it is clear that NFMS has decided that shallow pelagic longlining for swordish is to be outlawed in the U.S. Clearly this is a policy issue for the management authority, Regional Fishery Management Councils and not for NMFS to insinuate using the NEPA process. Logically, following this approach then we should look to ban all gears that have interactions with protected species such as demersal trawls, gillnets and purse seines.	NMFS is investigating all possible measures to help increase sea turtle populations and to mitigate the population-level impacts of sea turtle mortality from longline gear interactions. The decision to close the directed swordfish fishery is based on sea turtle population declines and on data that show most of the sea turtles takes in this fishery were by vessels targeting swordfish or a mixture of swordfish and tuna using shallow set longline gear. Recognizing that the Hawaii-based longline fishery is a small portion of the total amount of total fishing effort in the Pacific Ocean, NMFS plans to conduct research needed to develop gear technologies and fishing strategies for reducing sea turtle mortality resulting from longline gear interactions. This research may lead to new fishing methods to target swordfish that have much lower interactions with sea turtles than existing swordfish longlining techniques.
P84rr	written - Kitty Simonds	Contraction of longline fleet: loss of swordfish fishery. There are two scenarios for the preferred alternative, one where some swordfish boats switch to tuna targeting and the other where no switching occurs. The prospect of many swordfish vessels switching to tuna fishing is bleak. Most swordfish vessels have relocated to California, and are shedding their permits.	The text covers this point of not knowing the level of switching which will occur.
P84ss	written - Kitty Simonds	It should also be noted that the impacts for swordfish targeting vessels will be borne almost entirely by Vietnamese-Americans, adding a racial dimension to NMFS desire to outlaw longline fishing in the western Pacific.	The effects of the alternatives on Vietnamese Americans are discussed in Section 4.9.

Tracking No.	Commenter	Comment	Response
P84tt	written - Kitty Simonds	Hawaii will likely have a fishery that is two thirds the size of its usual fleet size over the past decade (110-120 vessels). The loss of income from the swordfish fishery will ripple through Hawaii's economy with employment losses likely to range 500-2000 jobs, based on various economic forecasts, which will be significant in a population of one million, in a state with an economy which is less diverse than those on the mainland.	The text covers this point of overall economic impacts.
P84uu	written - Kitty Simonds	Hardships for remaining tuna fleet. Further the two April-May month closure of the tuna fishery is particularly harsh for a fishing industry whose options are now limited to tuna targeting. How will most of the vessels which are essentially small businesses survive a two-month period without any income but with costs through that two-month period? There is no analysis or modeling of the effects of the two-month closure on the individual vessels in the fleet.	Text has been added to discuss closure. The impacts are not measurable in part due to the lack of monthly data.
P84vv	written - Kitty Simonds	It is possible that the longline vessels may gear up to conduct other methods of fishing such as pelagic handlining, vertical longlining, shrimp trapping etc., but these alternative methods are at additional costs and there are likely to be learning curves associated with entering new fisheries.	The text covers this point of not knowing the level of switching which will occur.
P84ww	written - Kitty Simonds	Further, handline fishing for tuna may bring the longline vessels into conflict with the offshore handline fishery operating out of the Big Island, particularly if vessels fish on the Cross Seamount or NOAA weather buoys, both in terms of crowding on these fishing grounds and also flooding the markets with juvenile tuna.	Although the point is well taken, it is too far down the chain of speculation to quantify.
P84xx	written - Kitty Simonds	Impacts more than lost revenues. Effectively some 500-600 fishermen will have to endure two months without wages, but continue to have to provide for their families, pay mortgages, school fees, medical bills etc., etc. The vessel owners will still have to pay vessel mortgages, mooring fees and be able to re-supply the vessel for fishing again at the end of the closed period. The impacts of all these measures on families is also likely to be severe. There are plenty of examples of the effects of wholesale employment loss or employment uncertainty in the U.S. and elsewhere, where this kind of stress leads to family breakups, alcohol and drug dependency, juvenile crime etc. etc. All these impacts have to be paid for by taxpayers in terms of welfare checks, hospital bills, extra policing etc., etc.	Additional information on the social and economic impacts of job loss and reduced income has been added.

Tracking No.	Commenter	Comment	Response
P84yy	written - Kitty Simonds	Small vessel tuna fishery cannot make up shortfall. If the Hawaii longline fishery contracts, it is extremely unlikely that the Hawaii small vessel fishery can make up the shortfall. The small vessels collectively catch between five-six million pounds, annually. The swordfish catch alone from mixed and swordfish fishing represents about six million pounds, worth $13 million which the small boat fleet simply cannot match through lack of capacity and inability to fish in all weathers. Instead, we are likely to see increased imports of fish into the State, possibly reaching levels which may reduce the price of domestically-caught fish, delivering a double blow for both to any remaining longliners and small vessel fleet.	The text covers this point of overall economic impacts.
P84zz	written - Kitty Simonds	Ecological consequences of reducing fishing mortality on sharks. The EIS does not discuss sufficiently the mortality rates of marine turtles, or the agents of natural mortality, particularly predation by sharks. Predation on Hawaii green turtles by tiger sharks is well documented yet is not included in the Chapter 3 discussion of Hawaii green turtles. However, later in the DEIS there is some discussion of the role of sharks and their effects on turtle populations from simulation models for the Eastern and West-Central Pacific Ocean. Because pelagic fisheries reduce the abundance of large sharks (Kitchel et al., 1999), pelagic ecosystem models which incorporate predation by pelagic sharks, along with estimates of shark and sea turtle mortality caused by fishing, suggest that reductions in fishing have overall negative impacts on sea turtle populations. This is because the increased abundance of, and predation by, sharks outweighs the reduced fishing mortality of sea turtles (IATTC, 1999) (see p 4-158 to 159).	While it is well documented that sharks consume turtles, at least occasionally, the level of such predation is entirely unknown. For pelagic waters, where turtles may diffuse, such predation may actually be low. Further, few sharks attain a large enough size to prey upon all but the smallest sea turtles.
P84aaa	written - Kitty Simonds	The preferred alternative will greatly reduce shark catches by the Hawaii longline fishery, since half the catch of swordfish targeting are sharks, principally blue sharks. While this is likely to have only a small effect on turtle populations Pacific-wide it may have some affect on turtle populations around Hawaii. Further, other measures such as the longline area closures around the Hawaiian islands may have reduced the catches of near-shore species such as tiger sharks and Galapagos sharks. These species are known to prey on turtles and other protected species such as monk seals and seabirds, yet there is no discussion of the possible impacts of the closed areas on these shark populations and subsequent predation on protected species.	While it is well documented that sharks consume turtles, at least occasionally, the level of such predation is entirely unknown. For pelagic waters, where turtles may diffuse, such predation may actually be low. Further, few sharks attain a large enough size to prey upon all but the smallest sea turtles.

Tracking No.	Commenter	Comment	Response
P84bbb	written - Kitty Simonds	No impact on turtle populations. Further, the loss of the swordfish fishery will create a hole in the U.S. market which will be filled by foreign imports, caught in fisheries with far less regulation than U.S. swordfish fisheries. This is likely to mean the number of turtles killed may actually increase as foreign fisheries expand to cater for the drop in U.S. supply.	NMFS must meet the legislative mandate under ESA. Additionally, due to lack of information, projections as to actions of foreign fleets are speculative.
P84ccc	written - Kitty Simonds	The plaintiffs in the litigation argue that statement about turtle takes elsewhere by foreign vessels or U.S. longline vessels from the West Coast are irrelevant and that while we cannot regulate these fisheries, we can regulate vessels with Hawaii limited entry longline permits. While this is true, in the broader context if the well being of turtles is not improved, then the question remains, what is the point of the litigation and the subsequent measures recommended in the EIS?	NMFS must meet the legislative mandate under ESA.
P84ddd	written - Kitty Simonds	Other alternative measures. Clearly swordfish fishing without mitigation measures for turtles is not going to be acceptable to the environmental community, and a short-term contraction of swordfish fishing will have to be endured by the fishery. However, some other possible options to save swordfish and swordfish/mixed fishing are given below. Due to differences in fishing methods between the Hawaii longline tuna and swordfish fisheries, sea turtle interactions are much greater for vessels targeting swordfish than for those targeting tuna. The reasons for this are: 1) swordfish gear is set much shallower than tuna gear, at a depth where sea turtles are more likely to occur; 2) the swordfish fishery uses lightsticks which might attract sea turtles; 3) the swordfish fishery occurs farther north than the tuna fishery and could be in areas of higher turtle densities. This is unconfirmed for many turtle species, but appears to be true for the loggerhead sea turtle. 4) Squid bait is attractive to some turtle species such as loggerheads. For these reasons, the following suite of options is put forth as a new alternative.	Introductory statement. No response required.

Tracking No.	Commenter	Comment	Response
P84eee	written - Kitty Simonds	Proposed Alternative 1. For the tuna sector of the Hawaii longline fleet, continue 20 percent observer coverage for a period of one year. At the end of one year, the data should be analyzed to determine if this amount of coverage effectively confirms the rarity of sea turtle takes as noted with three-five percent coverage. If this level of coverage does confirm the validity of the estimated sea turtle takes, then a minimum coverage level of no less than five percent can be applied to this sector of the fishery. This will free up additional observer resources for where they are most needed in the swordfish fishery. For the swordfish sector of the Hawaii longline fleet, allow the fishery to operate pending Council actions (i.e. Alternative 2), conducting the experimental fishery proposed under Option A, but require 100 percent observer coverage. Vessels will be asked to cooperate in testing the various mitigation methods described in Option A. Note that above 23° N. all vessels will in any case have to use blue-dyed bait after April 15, 2001, and therefore this option will effectively allow for the testing of this mitigation measure under normal fishing conditions. There will be a quarterly evaluation of the operations of the swordfish fishery, particularly with respect to the level of leatherback and loggerhead sea turtle takes, if any.	A new Preferred Alternative (Alternative 10) has been developed in response to comments and concerns and availability of information in the Pelagics BO. Observer coverage of 20% in the tuna longline fishery is part of the Preferred Alternative. Option A has been more fully developed in the EIS.
P84fff	written - Kitty Simonds	Proposed Alternative 2. This Alternative would continue to prohibit vessels from targeting swordfish except under a strictly controlled NMFS experimental regime. It assumes that all vessels in the Hawaii longline fleet will be targeting tuna using deep sets. Vessels wanting to target swordfish will have to apply to fish under a strictly controlled experimental regime developed by NMFS, and will have 100 percent observer coverage. Sets made to target swordfish will be limited, and will have specified hard target take limit for each sea turtle species. Once a target take limit is met, all vessels targeting swordfish fishing will cease, but vessels will be allowed to conduct normal tuna fishing operations. Since the catches of vessels fishing for swordfish may be constrained by the nature of the experimental regime, some form of financial compensation may be required. Vessels targeting tuna will have a 20 percent observer coverage and a separate take level for each sea turtle species will be estimated for this sector of the Hawaii longline fishery. There will be separate hard and soft take levels depending upon species. For example, exceeding the take level for Olive Ridley sea turtles would simply reinitiate the Endangered Species Act Section 7 Consultation whereas for leatherback sea turtles, and possibly loggerheads, it may result in a temporary fishery closure.	The new Preferred Alternative (Alternative 10) and Option A, the fishing experiment, incorporate many aspects of this proposed alternative. NMFS plans to conduct the research fishing experiment under an ESA Section 10 permit.

Tracking No.	Commenter	Comment	Response
P85a	written - John Stimson (UH Manoa)	The Hawaii longline fishery has been increasing since 1991 in terms of the number of hooks fished (Fig 3.10-Longline4 p3-128). This means that the potential for takes and kills of turtles by Hawaii longline boats has been increasing over the past decade. Presumably the foreign longline fishery in the area has increased too.	Data in Section 3.10 reflect the most recent trends for the Hawaii longline fishery.
P85b	written - John Stimson	The allowable take and kills of turtles have been consistently modified upward (with the exception of the take of Greens) in the successive BOs, but no biological basis has been given to justify these increases. The impression one gets is that the allowable take has been increased to match the estimated take. The failure to justify the take values is disturbing. The audacity of the statements about the allowable takes is alarming: "NMFS has determined that these maximum anticipated incidental take levels (formerly allowable take levels) are not likely to jeopardize the continued existence of any of the listed sea turtle populations affected by the Hawaii longline fishery." (BO 3 Nov 1998)	Information from the Pelagics BO has been incorporated into EIS.
P85c	written - John Stimson	A great deal of statistical effort (Skilonglineman and Kleiber 1998, McCracken 2000, Kobayashi and Polovina 2000, and reviews by Sissenwine 2000, Crowder 2000, and Hampton 2000) has gone into estimating and evaluating the takes and kills of these turtles. This level of effort was made necessary by: the low proportion of boats with observers, the difference between observer reports of takes and the logged reports those submitted by vessel operators) and the low absolute incidence of takes.	Statement is an observation. No response required.
P85d	written - John Stimson	Unfortunately, a commensurate effort has not gone into developing the values of allowable takes. Nowhere in the BOs (on which the Impact Statement is dependent) is a biological argument presented for how the allowable takes have been developed. The EIS does say (ES-5): "Due to the complex life history of sea turtles and their highly migratory nature total population estimates are difficult to obtain and are thus not reported in the literature." This is evidently a justification for not using the numerous published counts of nesting females, an index which almost universally indicates declines in turtle numbers. Asking for total population estimates is unreasonable, because fisheries biologists don't even have such numbers for fish populations, which are the subject of much more intensive study than turtle populations.	information from the Pelagics BO has been incorporated into EIS.

Tracking No.	Commenter	Comment	Response
P85e	written - John Stimson	The report does however go on to say that for the "purpose of determining trends in turtle abundance or population status, sea turtle populations are usually assessed from annual counts of nesting females which can be measured with accuracy. However, it must be acknowledged that a trend analysis requires a minimum of six-nine years of nesting beach surveys before the trend can be elucidated." It is not clear where the range six-nine years was obtained, but the essence of the second statement is true, because individual turtles do not re-nest for three or more years, and because like other natural populations, there are undoubtedly fluctuations in population size. Published reports of declines in annual counts of nesting females over periods of six-nine years or longer are available and could have been referred to in developing allowable take values in the BOs.	The 6-9 year time period is due to the 2-3 year time period between nesting seasons for indivdual turtles (or cohorts). For a trend to be determined requires at least three data points.
P85f	written - John Stimson	The Impact Statement acknowledges that turtle populations are almost universally in decline. "As reflected by their listing in the ESA, alongline sea turtle population(s) in the Pacific have declined to the point where their future is uncertain" p3-88(a). Or: "...it can be concluded that most sea turtle population in the Pacific are declining and are in danger of extinction;..." p4-10. Some of these declines are current and ongoing. Spotila et al 2000 report the decline of leatherbacks in Costa Rica (over 11 years), Chua 1988 and Limpus 1995 and J Mortimer 1992 report the decline in leatherbacks in Malaysia: 3103 nesting in 1968, 600 in 1978, 200 in 1980, 20 in 1993 and 2 in 1994. Spotila et al 1996 document numerous other examples of declines. Despite the generality and size of these declines throughout the Pacific, this evidence has been disregarded.	These values have been accounted for in the document.

Tracking No.	Commenter	Comment	Response
P85g	written - John Stimson	The EIS criticizes these data on declines in the abundance of nesting turtles (pES-6 and 4-10), yet these are firmer data about the change in abundance of a pelagic marine species (involving fewer assumptions) than anyone can generate for pelagic species of fishes. The EIS states that there is a lack of basic life history information on these turtle species which the EIS suggests (p4-10) invalidates the counts of nesting turtles. More specifically, the EIS says, for example, there is no information about sex ratio. This seems irrelevant; it is females that come out onto the beaches to lay eggs and are counted year after year and it is the survivorship of females (and their fecundity) which is essential for calculating estimates of population growth. The EIS says there is a lack of information about juvenile/adult ratios, presumably meaning survivorship to the age of first reproduction, and a lack of annual survivorship rates. These points are true; it would be useful to have these age specific survivorship figures, but their absence does not alter the fact that almost all populations of turtles are declining as indicated by nesting turtle counts. Fisheries biologists almost never have population counts, here they are available, but they are apparently being ignored when making the decisions about allowable takes.	The reviewer has misinterpreted the text. The EIS uses best available scientific data.
P85h	written - John Stimson	It seems difficult to justify biologically the upward revisions of take (Fig. 1) and kill numbers through the 1990s when turtle stocks were plainly in serious decline. There is no evidence that continuance or increase of the present allowable take and kill values are justifiable.	The new Preferred Alternative (Alternative 10) has been developed based on new information, comments, and analyses, including the Pelagics BO.
P85i	written - John Stimson	The history of management of fisheries of pelagic species has been consistently to destroy fish stocks. Few have been managed successfully without a system for limited entry. The fish stocks involved in this longline fishery probably face the same fate. Fishing effort does not decline quickly enough in the face of declining stocks and declining CPUE. The evidence of decline is rarely strong enough to convince government officials, bankers and fishers of the need to reduce or stop fishing. The irony is that in this case there is firm evidence that endangered species are being taken and killed by this longline fishery during a time of turtle population decline. If fisheries biologists had evidence this firm about any pelagic fishery they would clearly be able to justify the closure of the fishery at least temporarily. In this case, no one is willing to shut down a fishery which is contributing to the destruction of an endangered species.	In response to comments and concerns and availability of information and the Pelagics BO, a new Preferred Alternative (Alternative 10) has been developed.

Tracking No.	Commenter	Comment	Response
P85j	written - John Stimson	U.S. agencies should be temporarily shutting down this fishery and encouraging other countries to shut down their own longline fisheries. There should be international efforts to protect the turtle nesting grounds and rebuild the breeding populations. There should be research into the movements of the targeted fish and the turtle (using genetic identification of stocks and satellite tracking of individuals.) Once movements of these species are better understood and breeding colonies rebuilt, fishing can be reopened and targeted in space and time in a way which produces good catches but avoids the turtles.	NMFS is investigating possible measures to help increase sea turtle populations and to mitigate the population-level impacts of sea turtle mortality from longline gear interactions. The decision to close the directed swordfish fishery is based on sea turtle population declines and on data that show most of the sea turtles takes in this fishery were by vessels targeting swordfish or a mixture of swordfish and tuna using shallow set longline gear. Recognizing that the Hawaii-based longline fishery is a small portion of the total amount of total fishing effort in the Pacific Ocean, NMFS plans to conduct research needed to develop gear technologies and fishing strategies for reducing sea turtle mortality resulting from longline gear interactions. This research may lead to new fishing methods to target swordfish that have much lower interactions with sea turtles than existing swordfish longlining techniques.
P86a	written - Dave Raney (Sierra Club)	We strongly urge adoption of Alternative 7, the preferred alternative. We note the projected reduced take, and in view of threats to the survival of all these species, these are significant benefits.	The comment expresses a preference for an alternative. No response required.
P86b	written - Dave Raney	We do not support Option A in the context of the Hawaii longline fishery. Although we recognize the potential for new methods to be developed that may further reduce turtle bycatch, we cannot support an option that might inadvertently result in an increased take of turtles in the geographical area under discussion.	The comment expresses an opinion. No response required.
P86c	written - Dave Raney	Also, it appears to us that the turtle populations in this area are too small for the results of experimental methods to be significant.	Option A, a fishing experiment, is not a part of the Preferred Alternative. Specific time periods and numbers of sets required to generate statistically valid results are provided in the EIS.
P86d	written - Dave Raney	We consider observer coverage to be key to documenting, and perhaps deterring, interactions with marine sea turtles. Accordingly, we support continuation of observer coverage of the longline fishery at the current levels of 100 percent for swordfish and a minimum of 20 percent for tuna.	These levels are contained in the new preferred alternative and Option A.
P86e	written - Dave Raney	We also support the requirement that two seabird deterrent devices or methods by employed north of 25° (or 23°) N. latitude.	Mandatory deterrents listed in the STAL BO are included in Preferred Alternative 10.
P86f	written - Dave Raney	We further recommend that at least one seabird deterrent be required to be used at alongline times on all longline vessels operating in this fishery, regardless of the zone that they are fishing in.	Mandatory deterrents listed in the STAL BO are included in Preferred Alternative 10.

Tracking No.	Commenter	Comment	Response
P86g	written - Dave Raney	Sierra Club is already on record as supporting the ban on shark finning in all pelagic FMP-managed fisheries, and strongly supports the prohibition of domestic or international transshipment of shark fins through U.S. ports in the WPR.	Federal legislation banning shark finning has been made a part of the preferred alternative, Alternative 10 in the EIS.
P86h	written - Dave Raney	It is unfortunate that it took a lawsuit to force adequate consideration of the impacts of longline fishing on turtle populations. A more proactive and precautionary approach by the WPRFMC and NMFS could have spared all parties, including the longline fishers, a lot of pain. Nevertheless, we commend NMFS for selecting Alternative 7 as the preferred alternative. We urge you to stand firm on this alternative in the face of objections from longline fishing interests.	A new Preferred Alternative, Alternative 10, has been developed based on new information, comments, and analyses, including the Pelagics BO.
P87a	written - Jonathan Lee	I'm in for Alternative 1. I been fish or fishing related work ever since I was 14 years old, and tell you the truth, I saw turtle caught on the line only once.	The comment states a preference for an alternative. No response required.
P87b	written - Jonathan Lee	Our 65 percent income revenues is depended on those two months of April and May. Also most active months of the years. By closing these two months not only drag fishermen into more death financially, and also put more strain on income heading into slower part of the years (June, July, and August.)	Alternative 10, the new preferred alternative, allows year-round effort in the tuna sector of the Hawaii-based longline fishery.
P88a	written - Linda Paul	The Hawaii Audubon Society would support Alternative 7, pending proposed adjustments to the Pelagics FMP (Alt 2) and without Option A, as long as it included: 1) NMFS proposal (DEIS 2-10) setting forth mandatory seabird bycatch mitigation measures,	The comment states a preference for an alternative. No response required. The mandatory measures established in the STAL BO are included in the preferred alternative.
P88b	written - Linda Paul	2) A prohibition on the use of lightsticks to help mitigate albatross chick mortality,	The comment states a preference for an alternative. No response required. The mandatory measures established in the STAL BO are included in the preferred alternative.
P88c	written - Linda Paul	3) A prohibition on longline fishing within 200 miles of the NWHI during the months of November through March when albatross are foraging near the islands to feed very young chicks,	The comment states a preference for an alternative. No response required.
P88d	written - Linda Paul	4) A mandatory VMS installed on every vessel monitored 24 hours a day by computer (automated) to enforce these prohibitions,	The comment states a preference for an alternative. No response required.
P88e	written - Linda Paul	and 5) An observer coverage requirement: 100 percent for the swordfish longline fishery; 25 percent for the tuna longline fishery.	The Pelagics BO mandated levels of observer coverage are attached to the preferred alternative in the EIS.

Tracking No.	Commenter	Comment	Response
P88f	written - Linda Paul	We do not support adding Option A to the preferred alternative because it would open the door to longline fishery in closed areas during closed times and thus cancel out the bycatch-avoidance benefits of the preferred alternative. To date none of the current methods suggested to mitigate turtle bycatch other than closed areas and times have proven effective and/or enforceable. The rate of turtle interaction is too low to allow statistically reliable results unless this "experimental" fishery continues for a very long time. By the time a mitigating gear type may be proven effective, one or more of the turtle species vulnerable to this fishery could become extinct. Field experiments should be conducted where there is a higher rate of interaction with species and populations not approaching extinction, and in locations not covered by the U.S. ESA, i.e., the Azores, where such experiments aer currently being conducted.	Option A nas been more fully developed in the EIS. Specific time periods and numbers of sets required to generate statistically valid results are provided.
P89	ORAL		
P90a	written - Henry Sesepasara	The publicity for the hearing was good as far as the local media is concerned. We heard about the hearing on the local radio station, and read in the local newspaper. The date scheduled for the hearing was a very poor choice. I thought that your agency is aware of the transportation problems we have here in American Samoa. With only two flights a week between Honolulu and Pago Pago, scheduling a meeting or hearing on the next day of flight arrival is not a safe schedule. The local fishermen and boat owners planned their fishing trips around the time you advertised for the public hearing. When Hawaiian Airlines canceled its flight, the local fishermen could not change their fishing schedule any more.	The hearing schedule was quite compressed and travel itineraries were as efficient as possible. We could not predict the unexplained 24-hour delay in the Hawaiian Airlines flight.
P90b	written - Henry Sesepasara	I found out that there was no local fishermen or boat owner that attended the hearing. Most of those attended are staff of the DMWR, and two other Palagi (white men). I was also told that these are boat owners of the bigger longliners from outside of American Samoa. The same size of longliners that we are very much concerned about.	The comment is an observation. No response required.
P90c	written - Henry Sesepasara	Most fishermen want to discuss the issue of the area closure, and wanted some more information from your agency representatives at the haring. Some cannot put their comments in writing but want some kind of informal discussion. If you had scheduled this public hearing on Monday rather than Saturday, we would have made our plans accordingly.	Because of the cancellation of the Friday flight, the hearing was rescheduled for Monday.

Tracking No.	Commenter	Comment	Response
P90d	written - Henry Sesepasara	If you need help to schedule future hearing, the Tautai-o-Samoa Fishing Association can help coordinate for your agency. I'm the Secretary of the Association and you can reach me through WPRFMC, DMWR or (684) 633 5908 or 733 2385.	Thank you for the offer. We will seek your assistance in scheduling future hearings.
P90e	written - Henry Sesepasara	American Samoa Area Closure. We appreciate the fact that you have considered an area closure for American Samoa, although we are not getting the original 100 miles we requested some three years ago, including some alternatives such as the limited entry time frame and vessel size limits.	Comment noted; 50nm American Samoa incorporated in Alternatives 2, 4-7, and 10.
P90f	written - Henry Sesepasara	Section ES.1.2, you mentioned that the U.S. purse seiners "fishery is not discussed in detail in the EIS because it has not raised any major management issues addressed by the Council." How can you not discuss this fishery in detail when it is this fishery that has voiced a strong opposition to our request for a 100-mile area closure. I believe that you should make sure that this issue is addressed now and not later when a conflict comes up.	Addiitional information about the U.S. purse seine fishery is contatined in other sections of the EIS.
P90g	written - Henry Sesepasara	The ES points out the rapid growth in the Hawaii-based longline fishery due to influx from mainland vessels, which were larger and had more fishing capacity... small boat fishers were concerned that they might be intercepting fish migrating towards inshore areas thus reducing opportunities. These are the same concerns we have in American Samoa. We now are witnessing the addition of bigger longliners with more fish capacity than our existing *alia* fleet. Please consider these problem issues in Hawaii that they can also happen in American Samoa.	A 50nm American Samoa incorporated in Alternatives 2, 4-7, and 10. Also, Alternative 9 proposes examination of catch competition issues throughout the Western Pacific Region.
P90h	written - Henry Sesepasara	The American Samoa fishing community supports the restriction of shark finning in our fishing area. It is the Samoan culture that the whole fish should be utilized and not to be wasted.	The comment expresses an observation. No response required.
P90i	written - Henry Sesepasara	Turtle is important to our culture and we have several stories and legends that relate to these animals. We have requested through the WPFC to include American Samoa on turtle studies as was done for CNMI about a year ago. I would like to remind you that same request again.	Request noted.

Tracking No.	Commenter	Comment	Response
P90j	written - Henry Sesepasara	There are no information and data on any of the sea birds and turtles that are caught on the local longline fisheries or any other fishery. This has never been a problem in American Samoa.	While turtle takes have been documented in logbook data for American Samoa, the lack of observer coverage in that fishery has not permitted confirmation. The new Preferred Alternative (Alternative 10) includes a provision for observers throughout the Western Pacific Region where feasible.
P91a	written - William Gilmartin	I agree that Alternative 7 presents the best management strategy for these fisheries. I am strongly opposed to inclusion of Option A.	The comment expresses a preference. No response required.
P91b	written - William Gilmartin	Observer coverage of the pelagics fisheries is critical and should be maintained at the current levels: 20 percent minimum on tuna longline boats and 100 percent on swordfish longline boats.	These are the levels specified in the new Preferred Alternative (Alternative 10) and Option A.
P92a	written - Gene Vander Hoek	Once again the powers that be have found a way to ignore the economical and social impact that the Hawaii charter and recreational boat industry has on these Hawaiian islands.	An analysis of social and economic impacts on the charter and recreational fishing industries have been included in the EIS to the extent that data permit.
P92b	written - Gene Vander Hoek	Let's take one customer who lives on the west coast and fishes at least five days a year here in Kona on our boat. He pays $675 per day total $3375. He stays a minimum of seven days in order to fish five. Let's say $200 a day on average hotel total $1400. He, his wife and child pay at least $1800 to fly roundtrip to and from the mainland. While here during that week they spend on food and other miscellaneous items at least another $2000. That puts his total to come here to Kona and fish five days for our blue and striped marlin and shortbill spearfish and yellowfin tuna at $8575. We fish close to 200 days a year with all of those people contributing similar numbers. His cost down to a one day per fishing expenditure comes out to $1715 per day fished times 200 comes out to $343,000 spent by our clients alone! Now count the working charter boats in the Hawaii chain.	Visitors to Hawaii engage in a number of activities while they are here; it is not valid to attribute the entirety of their expenditure in Hawaii as generated by charter boat industry.
P92c	written - Gene Vander Hoek	What we should win is some respect from government agencies that have anything to do with the fish that we fish for that bring in so much money to so many. It appears that the Charter and Recreational fleet is the one to back. To use a English phrase "at the end of the Day" we can insure there will be something to catch in the future, whereas the longliners can only insure the almost complete elimination of the billfish here in the Hawaiian Islands.	The comment is an opinion. No response required.

Tracking No.	Commenter	Comment	Response
P92d	written - Gene Vander Hoek	If I may just briefly touch on te environmental aspects of large scale slaughter of billfish and underdeveloped yellowfin and bigeye tuna. It is clearly a fact that any longline fleet whereever it fishes out of U.S. waters does so until there is very little left to fish for and then they move on to destroy the next fishery. The tuna boats that are based out of the Hawaiian Islands to fish our seamounts are systematicalongliney eliminating Yellowfin & Bigeye Tuna from our future.	The data from various segments of the high seas fleets indicate that no PMUS species are overfished and, in fact, most species are stable or increasing under current conditions.
P93a	written - Joe Arceneaux	I wonder how important experimental design is to NMFS when closing down the fishery for two months in addition to the permanently closed area "A" is based on scant and insufficient evidence that independent reviewers state can't be used to say anything. There's not even enough data to show a trend.	Alternative 10, the new preferred alternative, allows year-round effort in the tuna sector of the Hawaii-based longline fishery.
P93b	written - Joe Arceneaux	The saddest result is the fact that there are large fleets of longliners, non-U.S. flagged, fishing in the area closed to U.S. flagged longline fishing effort. Just a portion of these fleets fish in two-three months the same amount of hooks the Hawaii fleet fishes in an entire year. This closure option does nothing to save any turtles, and in fact serves to ensure that more sea turtles will be killed (re: eaten) than would be the case if the Hawaii fleet still operated across its former (re: pre-decision) range.	The possibility of increased takes of protected species by displaced Hawaii vessels operating in other fisheries is discussed in Section 4.11.
P93c	written - Joe Arceneaux	By this same logic, why doesn't the FWS use this decision to support a ban on cars in south Florida, because it's proven that every other year or so, very endangered Florida panthers are hit and killed by autos. Or why not place a seasonal ban on cars on the road that passes near Kealia Pond on Maui. They hit gravid female sea turtles crossing the road to nest, and the nesting season is known.	The recommended actions are outside the scope of this EIS.
P94a	written - Michael Fujimoto (HIDAR)	State of Hawaii, Division of Aquatic Resources.The DEIS seems to be well-written and comprehensive, and our compliments go to the authors for producing a generally good document under a great deal of pressure.	The comment is appreciated.
P94b	written - Michael Fujimoto	We have some concerns about the alternatives in the DEIS, but lacked the time necessary to submit full comments from the Department, given the size of the draft and the short 45 day comment period allowed. We look forward to another opportunity to provide comments at some time in the future.	Opportunities for future comment include a 30-day period following availability of the EIS, Council meetings, and hearings associated with development of regulations.

Tracking No.	Commenter	Comment	Response
P95a	written - W Muffett, Y Borreson (Defenders of Wildlife)	Because of the brevity of the public comment period, however, our comments herein are restricted to the Hawaii longline fishery. By focusing our comments on this one fishery, we do not intend to suggest that no other area or gear type raises significant conservation issues.	Introductory statement. No response required.
P95b	written - Wilonglineiam Muffett, Yvonne Borreson	Defenders commends the drafters for the considerable effort represented by the DEIS. We appreciate the scope, level of detail and general candor of the draft and believe it provides an excellent foundation for a comprehensive review of the environmental impact of the U.S. pelagic fisheries.	The comment is appreciated.
P95c	written - W Muffett, Y Borreson	We recommend that a new alternative be explored in the FEIS which combines elements of Alternatives 6 and 7 with additional measures to further reduce seabird mortality.	The EIS has been revised to include information provided in the STAL BO.
P95d	written - W Muffett, Y Borreson	FEIS should summarize the aggregate environmental impact of longline fisheries. The DEIS makes no effort to paint a composite picture of the negative environmental externalities of longlining. Those wishing such a picture must cobble it together from hundreds of pages of text addressing individual species or taxa, or find the relevant figures buried among the table in chapter 4. In order to allow users to better evaluate the information provided, we recommend that an overview of the environmental impact of longline fisheries be included in the ES of the FEIS and that a longer discussion of the aggregate impacts, reflecting the effects of longlining on all non-target species, be incorporated into Chapter 3 or 4.	The Executive Summary and Chapter 4 have been revised for the EIS.
P95e	written - W Muffett, Y Borreson	Strong Measures are Warranted to Protect Sharks. Defenders supports the proposal in Alternative 6 to institute seasonal closures in alongline Hawaii longline fisheries and to permanently close the are north of29° N. latitude to longline fishing. The closure of this area to longliners will be of particular benefit to blue sharks because of its proximity to the blue shark nursery in the NPTZ.	The comment is an opinion or a preference. No response required.

Tracking No.	Commenter	Comment	Response
P95f	written - W Muffett, Y Borreson	Defenders also recommends that the FEIS provide additional information on the impact of longlining on mako and thresher sharks, which will not benefit significantly from the Shark Finning Prohibition Act. Although commercial interest in these species would probably not support a directed fishery, local markets nonetheless for their meat. As a result, a high proportion of mako and thresher sharks incidentally taken by longliners are ultimately landed. The numbers of these sharks taken are small when compared to the number of blue sharks taken. Nonetheless, the numbers of some species are sufficiently large to warrant a fuller investigation of their possible population impacts. For example, the K-P Model estimates a one-year take for thresher sharks of 17,78 individuals. (Table 4.8-5) Observer data on sharks caught in the longline fishery indicate that the bigeye thresher accounts for the vast majority of the threshers taken as bycatch. (Table 3.4-4) The bigeye thresher is a late-breeding species with low fecundity. The rapid collapse of thresher shark fishery in California in the 1980s, together with its low fecundity, suggest that the species may be particularly vulnerable to over exploitation. For this reason, we recommend that the FEIS include additional analysis of the potential impact of longlining on this and similarly-situated species.	The data concerning the stock characteristics and distribution of this species are insufficient to allow more refined estimates of the impact of the Hawaii longline fleet on population dynamics. However, compared to international fleets, Hawaii's harvest of this species is believed to be small.
P95g	written - W Muffett, Y Borreson	Stronger measures are required to protect seabirds. Defenders commends NMFS for recognizing the need to reduce the incidental catch of seabirds in the Hawaii longline fishery; however, we have grave concerns about the adequacy of the preferred alternative to protect albatross and other seabirds from dying as a result of longline fisheries. Thousands of seabirds die each year after becoming entangled in or hooked by longline fishing gear. We ask NMFS to incorporate within its preferred alternative additional measures to reduce interactions between seabirds and longline fisheries.	The seabird deterrent measures mandated by the STAL BO are incorporated into the preferred alternative.
P95h	written - W Muffett, Y Borreson	Many nations are taking steps to reduce the incidental catch of seabirds in longline fisheries and are adopting NPOA, as required by the FAO IPOA-Seabirds. As other nations craft their NPOA, they will look to the U.S. as an example because of our strong stance during the creation of the IPOA. Although our own NPOA is not yet complete, our actions will speak loudly. The U.S. is in the position to be a strong leader in the conservation of seabirds by demonstrating to other nations that this is a matter that is taken seriously and that the incidental take of seabirds is not acceptable.	NMFS is committed to fulfilling its international obligations relating to protected species.

Tracking No.	Commenter	Comment	Response
P95i	written - W Muffett, Y Borreson	The DEIS does not adequately protect seabirds. The preferred alternative should be strengthened, with the goal of virtually eliminating seabird bycatch. All Hawaii longline vessels should be required to weight their lines and use a bird scaring line. Weighting lines is the most effective method available to reduce seabird bycatch. According to FAO-published *Incidental Catch of Seabirds by Longline Fisheries: Worldwide Review and Technical Guidelines for Mitigation*, 3-7x more birds may be caught on light gear and than if the proper weight and position on lines are used, incidental catch of seabirds could be largely avoided. Bird scaring lines are also very effective in reducing seabird bycatch almost universally and should be mandatory on all longline vessels. The publication state that bird scaring lines can reduce seabird bycatch by as much as 70 percent, which is a conservative estimate. Both bird scaring lines and weighting lines are relatively inexpensive and easy to implement. FAO estimates that seabird bycatch is reduced by 85 percent in pelagic fisheries when bird scaring lines and weighted lines are used together. Requiring the use for these techniques is vital to reducing seabird mortality due to longline fisheries.	The seabird deterrent measures mandated by the STAL BO are incorporated into the preferred alternative.
P95j	written - W Muffett, Y Borreson	We have grave concerns regarding using a "pick list" or menu-like system in which boat crew choose two of six seabird mitigation methods as required in Alternatives 2 and 7. The effectiveness of two of the methods is highly questionable and, therefore, should not be available as the sole method of deterring seabirds. Mitigation techniques included in the EIS should be scientifically proven to be effective. According to *The Incidental Catch of Seabirds by Longline Fisheries: Worldwide Review and Technical Guidelines for Mitigation*, strategic discharge of offal during setting or hauling, while providing a distraction from baited hooks, can also attract birds to the vessel. Dumping offal while longline gear is being set or hauled succeeds in attracting a larger number of birds to the area which increases the number of birds that could come in contact with baited hooks. For these reasons FAO generally does not recommend this mitigation technique. The use of blue-dyed bait as a mitigation method has not been proven effective although early tests are promising. Until further study has been done and blue-dyed bait has been proven an effective mitigation method, the use of this technique in combination with strategic offal discharge should not be advocated. The mitigation techniques used by longline vessels must be proven effective in eliminating seabird bycatch.	The seabird deterrent measures mandated by the STAL BO are incorporated into the preferred alternative.

Tracking No.	Commenter	Comment	Response
P95k	written - W Muffett, Y Borreson	Seabird avoidance measures should apply to all waters. We strongly encourage NMFS to reconsider applying the DEIS to a management area north of 25° N lat (or 23 ° N lat) for Alternative 2. The goal of the DEIS should be to eliminate seabird bycatch; therefore, every measure should be taken to ensure no birds are killed due to the longline fishery. The FWS' Nov 2000 BO for Short-tailed Albatross states that requiring seabird deterrent measures north of 25° N latitude "does not adequately cover areas where the short-tailed albatross may occur." Further, fig 3.10-LL20 on p3-180 of the DEIS demonstrates that a large number of interactions occur south of 25° N latitude. Increasing the area to which the alternative wil apply will lead to fewer deadly seabird interactions with longline fishing vessels.	The seabird deterrent measures mandated by the STAL BO are incorporated into the preferred alternative.
P95l	written - W Muffett, Y Borreson	All alternatives should include observer coverage. The preferred alternative should include mandatory expanded observer coverage to at least 25 percent coverage throughout the longline fishery to monitor interactions with seabirds and other non-target species. Prior to 2000, fewer than four percent of the fishing trips were being observed. When 12 of 14 observers in Hawaii were dismissed from their duties last year, this figure dropped well below one percent. Observer data is critical to assess the frequency of seabird interactions and seabird mortality. Observers must be given proper training in marine species identification and boat owners and operators must be required to cooperate with the observer while that person is onboard.	The new Preferred Alternative (Alternative 10) includes mandated observer coverage of 20%.
P95m	written - W Muffett, Y Borreson	We applaud the inclusion of NMFS' annual protected species workshop and requiring attendance of Longline boat owners and operators in Alternative 2.	This requirement is also contained in the preferred alternative.
P95n	written - W Muffett, Y Borreson	The FEIS should include a new alternative which combines Alternatives 6 and 7. In order to improve outcomes with respect to both seabirds and sharks, Defenders respectfully requests that NMFS incorporate the recommendations set forth herein into the FEIS as a new preferred alternative. This alternative should include all the management measures currently contained in Alternative 7, as well as the following additional measures: 1) permanent closure of the area above 29° N latitude to longline fishing as outlined in Alternative 6; 2) the application of seabird protection measures to longline fishing operations north of 25° N latitude; 3) the application of the additional seabird protection measures as above; and 4) increased observer coverage on alongline longline vessels.	The new Preferred Alternative is (Alternative 10) compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning.

Tracking No.	Commenter	Comment	Response
P96a	written - Jerry Zak	A two-month closure of longline fishing will cost me 25-30 percent of my gross income for the year, which amounts to a loss of $90,000 to $108,000. The peak revenue producing months are December to the end of June.	Alternative 10, the new preferred alternative, allows year-round effort in the tuna sector of the Hawaii-based longline fishery.
P96b	written - Jerry Zak	I don't understand how longline fishing has much of an impact on turtles. Most fisherman I have spoken to have either never seen a turtle or may have seen two or three turtles in their fishing career.	Interactions by the Hawaii-based longline fisheries have been documented by NMFS observers.
P96c	written - Jerry Zak	American fishermen are actually turtles best friend. Longline fishermen believe that live turtles are good luck. It is bad luck for them to injure or kill a turtle.	The comment is an observation. No response required.
P97a	58 form letters	I am writing to express support for the objectives listed for preferred Alternative 7. Specificaliy I support efforts that reduce turtle takes by stated percentages. Without significant measures to reduce their take in commercial fisheries, they may go extinct in 5-10 years (Spotila et al 2000).	The new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning.
P97b	58 form letters	I am opposed to any "experimental fishery" that could increase incidental take of sea turtles above the proposed take levels rates described in preferred Alternative 7. The rate of turtle capture necessary to obtain statistically significant results would be unacceptably high considering the critically endangered status of these turtles.	Option A has been developed more fully in the Final EIS.
P98a	91 form letters	I am writing to express my support for Alternative 8 in the DEIS. While the objectives listed for preferred Alternative 7 are a significant improvement over the current management regime, the take reduction that Alternative 7 calls for may be insufficient to protect these species. Without significant measures to reduce their take in commercial fisheries, they may go extinct in 5-10 years (Spotila et al 2000).	The new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning.
P98b	91 form letters	I am also opposed to any "experimental fishery" that could allow incidental take of sea turtles. The rate of turtle capture necessary to obtain statistically significant results for an "experimental fishery" would be unacceptedly high considering the critically endangered status of these turtles.	The comment is an observation, opinion or preference. No response required.

Tracking No.	Commenter	Comment	Response
P99a	135 form letters	I work for a Hawaii seafood company. The business would not survive without a year-round supply of fresh tuna and other fish from the Hawaii longline fishery. Another good job would be hard to find if there is no work for two months. The preferred alternative endangers my job and jeopardizes the survival of my family and community.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P99b	135 form letters	I do not understand the preferred alternative. The document actually says that eliminating Hawaii's swordfish longline fishery and closing the tuna longline fishery for two months every year Alternative 7 could make things worse for sea turtles worldwide. The preferred alternative would move fishing and turtle impacts to other places, where there is a weaker tradition of conservation than in Hawaii.	The possibility of increased takes of protected species by displaced Hawaii vessels operating in other fisheries is discussed in Section 4.11.However, a new Preferred Alternative (Alternative 10) has been developed which allows for year-round tuna longline fishing in some areas.
P100a	30 form letters	I am a manager/owner of a Hawaii seafood company. The majority of our total sales consists of fresh tuna and associated species landed by the Hawaii longline fishery. The proposed two-month closure of the entire Hawaii longline fishery in preferred alternative would force me to a) suspend business, or b) purchase imported tuna to substitute for the absence of domestic longline tuna during the two-month closure.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P100b	30 form letters	The DEIS is accurate in stating that Hawaii wholesalers will have difficulty in importing tuna of equivalent high quality. The lower-grade tuna commonly offered for sale by importers will not satisfy my customers and I will lose sales. Even after the Hawaii longline fishery is reopened in June, our sales will not fully recover to pre-closure levels because of low market exposure for two months. This patter of closing and opening the Hawaii longline fishery will cause attrition that is likely to eventually bring about much greater dependence by Hawaii's consumers on imported tuna over the long term.	Information on the increased reliance on imported fish added to the EIS. However, a new Preferred Alternative (Alternative 10) has been developed which allows for year-round tuna longline fishing in some areas.
P100c	30 form letters	We are asked to make this sacrifice to reduce "takes" and mortalities of sea turtles in the HI Longline fishery. However, during the 2 month closure our company wilongline depend on fresh tuna imports from a global supply system. As the DEIS point out, many of the potential sources of substitute tuna products are poorly-regulated fisheries which have much higher takes of protected species than the HI Longline fishery. The DEIS explains how such cumulative effects of the pref alt have a good chance of resulting in a net increase in global sea turtle mortality. The DEIS does not explain how this leads to the choice of pref alt.	The possibility of increased takes of protected species by displaced Hawaii vessels operating in other fisheries is discussed in Section 4.11.

Tracking No.	Commenter	Comment	Response
P100d	30 form letters	The DEIS does not explain how a net increase in sea turtle mortality could possibly follow the "precautionary principle" that is supposed to guide NMFS' actions.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas. However, NMFS must meet the legislative mandate under ESA.
P100e	30 form letters	When my customers ask about the origin of imported tuna and about possible impacts on sea turtles and other protected species, I am no longer able to give them hard data from the Hawaii longline fishery. This will be an unfortunate outcome of the preferred alternative - seafood marketers and consumers will have to worry about the adverse impacts on protected species that we are importing with every pound of substitute fish to replace Hawaii longline fish.	The comment is an observation, opinion or preference. No response required.
P101a	59 form letters	NMFS' preferred alternative would have a severely negative impact on my livelihood. The April-May closure would make it impossible for me to maintain sufficient income to operate my business.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P101b	59 form letters	I would request a change in the preferred alternative to Alternative 1 with Option A. Doing this would allow tuna vessels having a low turtle interaction rate to continue fishing while at the same time keep the swordfish vessels operating on an experimental basis. This would allow the fishery to develop new turtle mitigation devices which could then be exported to other foreign longline fleets and thus have a very positive effect on the turtle problem.	The comment is an observation, opinion.
P102a	6 form letters	Hawaii longline fish have a reputation in restaurant markets as wholesome, versatile and exotic. This is a distinct marketing advantage for chefs both in Hawaii and on the U.S. mainland. Hawaii chefs have created a unique Hawaii regional cuisine that reinforces the special image of the islands and appeals to visitors. The NMFS preferred alternative would reduce the supply of locally-caught fresh pelagic fish by 85 percent during the months of April and May, when the Hawaii tuna longline fishery would be closed. If I substitute imported fish, our restaurant will just be serving food, rather than providing a true Hawaii experience. Opportunities for restaurants to cross market diversified agriculture products from Hawaii wilongline also be lost because it will make no sense to feature local greens, fruits or seaweed with fish products from Indonesia, the Philippines or South America.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.

Tracking No.	Commenter	Comment	Response
P102b	6 form letters	Your preferred alternative is bad for restaurants, for suppliers of Hawaii products, for tourism and for all seafood consumers who love fresh Hawaii fish. The federal government is, in effect, dictating what appears on our menus. By forcing Hawaii longline fishing to go elsewhere and by forcing restaurants in Hawaii and the U.S. mainland to substitute fresh tuna and swordfish imports for Hawaii products, the preferred alternative could increase sea turtle mortality overalongline. How do I explain this to my customers?	The possibility of increased takes of protected species by displaced Hawaii vessels operating in other fisheries is discussed in Section 4.11.
P102c	6 form letters	The power of the consumer and market place can be harnessed for sea turtle conservation, as described in Section 4.11 and 5 of the DEIS. Hawaii is a good place to start because fishermen, marketers and chefs already have a track record for solving resource problems. Through marketing and promotion, the Hawaii seafood industry has created sufficient demand to absorb virtually all of the non-tuna species caught incidentally in the tuna longline fishery.	The comment is an observation, opinion. The willingness of the industry to assist in sea turtle conservation has been noted in testimony on the Draft EIS.
P103a	5 form letters	The considered seasonal closure of the Hawaii longline fishery could result in a shortage of reasonable priced fish from April through late June. This closure would come at a time when the demand for fish is high. Lent, Mother's Day, high school graduations, weddings, Father's Day and summer luaus are some of the events creating this strong demand for fish. The people in Hawaii eat a lot more fish per person than any other state.	The text covers this point of overall economic impacts and seasonal (and holiday) closures. What is now landed from local boats may have to be imported in the future but since there is not a world shortage and since overall tuna landings are not anticipated to change significantly, the international market should be able to satisfy local demand if, possibly, at a somewhat higher price.
P103b	5 form letters	The April-May closure is supposed to reduce accidental interactions with sea turtles by Hawaii longline fishery boats. The DEIS points our that many of the potential sources of substitute tuna products (imports) are poorly regulated fisheries which have much higher "takes" of protected species than the Hawaii longline fishery. If the DEIS acknowledges Alternative 7 could likely result in a **net increase** in global sea turtle mortality, how can Alternative 7 be considered a "preferred" alternative?	The possibility of increased takes of protected species by displaced Hawaii vessels operating in other fisheries is discussed in Section 4.11. However, a new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P104a	written - Richard Gallimore	This new ban is going to severely hurt the fishing industry in Hawaii, along with Hawaii's economy. I really think the ban is both unfair and economically disastrous to Hawaii's fishing industry.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.

Tracking No.	Commenter	Comment	Response
P104b	written - Richard Gallimore	There are other U.S. fisheries that catch probably ten times more turtles than we do, but they have not had any restrictions placed on their fishing. Why are we restricted by this ban when there is no ban for vessels from Alaska, Washington, Oregon, California, Japan, Korea, etc.?	Biological Opinions and new regulations are currently being developed for other Pacific domestic fisheries. The United States has no jurisdiction over foreign fisheries.
P104c	written - R Gallimore	The fisherman in Hawaii would like to know why they have been singled out to pay the price for the restoration of the turtles.	NMFS has a legislative mandate under ESA to undertake species protection.
P105a	written - Sean Timoney	I am writing in opposition of the proposed April-May closure of the longline fishing industry. The proposed two month closure will mean the loss of income for myself, my captain and crew and their families. Cutting these people off for two months will create unjust economic hardships.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P105b	written - Sean Timoney	The proposed two-month closure will mean the loss of Hawaii's premier fresh fish market. This State has worked hard to promote the fish that we produce and Hawaii-caught fish is now synonymous with the best quality you will find anywhere in the world. Closing us down for two months will force fish buyers to look elsewhere to provide the fish that locals and tourists alike have come to enjoy and expect. When fish buyers go elsewhere, how do we really know that these fish don't come from places that have complete disregard for the environment including unreported turtle-takes?	The possibility of increased takes of protected species by displaced Hawaii vessels operating in other fisheries is discussed in Section 4.11. Howver, a new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P105c	written - Sean Timoney	When fish buyers have found other suppliers, is there a guarantee that they will be willing to support us after the closure? Will we ever get our market back? A closure will have a stronger effect than most people realize. Our market is a fragile entity that has been worked on for years. We could easily be closed down for good by this proposed closure.	Economic theory and actual evidence indicate that markets are very flexible. If product is available, and it is of equal or better quality than is available from other sources, the market will be there to buy the fish. Few fisheries around the world are year-round, and almost all have no problems selling their product.
P105d	written - Sean Timoney	The proposed two-month closure will tie boats up to the docks. With no income, how can everyone pay for the State-required insurance and the per diem harbor fees that accrue with each day? Is NMFS prepared to reimburse 100+ boats? Will the State be prepared to handle that many boats? Boats are expensive to keep operational, let alone tied to a dock. This alone may force some boats out of business.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.

Tracking No.	Commenter	Comment	Response
P106a	written - Jong Il Paik	I submit this comment for myself and on behalf of Korean longline fishermen incapable of the English language. Through dedication and persistence we have contributed much to gain benefit and prosperity to the tuna industry and the economy of our State. We stand united in opposition to the April-May "closure" drafted by NMFS. It will adversely affect our lives, our livelihood, and eventually lay waste and desolation to the tuna and swordfish industry.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P106b	written - J I Paik	Longliners do not impact the existence of birds and turtles.	Observer coveragein the Hawaii-based longline fishery has documented interactions with protected species.
P106c	written - Jong Ii Paik	Loss of fishery jobs during the period of time will diminish our work force, and send them away to find land jobs or seek unemployment benefits.	The comment is an observation.
P106d	written - Jong Il Paik	Once the work force leaves and enjoy unemployment benefits, they will be tempted not to return until benefits fully expire. Unemployment will increase.	The comment is an observation.
P106e	written - Jong Il Paik	Those who find jobs on land where it is safe and nearer to their loved ones, will not return to fishing. Will the "skilled" workforce be available after two months idle? It is uncertain they will.	The comment is an observation
P106f	written - Jong Il Paik	Tedious recruiting and training will be required after each year closure, presenting a serious hardship to boat owners and captains.	The comment is an observation
P106g	written - Jong Il Paik	Having unskilled workers on vessels is hazardous and dangerous. In desperation, we may not have any alternative.	The comment is an observation
P106h	written - Jong Il Paik	Re-hiring skilled workers will be burdensome and may be difficult to find, especially during the summer low catch months when tuna is scarce and the hard work is not attractive, when pay is nil. No catch, no pay.	The comment is an observation
P106i	written - Jong Il Paik	To prevent skilled fishermen (without benefits) from quitting, may require boat owners to subsidize them, to provide living expenses for continuous employment during closure months.	The comment is an observation.
P106j	written - Jong Il Paik	Only those vessels that can "afford" to provide temporary subsistence to non-employment benefit workers will thereby be at a greater advantage over those vessels who are not able to afford to do so.	The comment is an observation.

Tracking No.	Commenter	Comment	Response
P106k	written - Jong Il Paik	Hawaii is isolated and unique, surrounded by ocean, whose fishery is different from coastal States. The majority of boats here are small, regulated, family-operated, whereas huge conglomerate corporations exist in other mainland fisheries, boats are many and larger size than in Hawaii. Why must a vast closure regulation be imposed upon us so unfairly, in light of our different fishing style and small boat operations?	Neither small vessel size nor small corporation size would provide a fishery exemptions from protected species laws and regulations. These same laws and regulations are being applied to other U.S. fisheries that interact with protected species.
P106l	written - Jong Il Paik	No fishing, no money for two months. How can we fisheries feed our families, educate our kids, pay our mortgages, loans, rents, workers, numerous operational costs?	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P106m	written - Jong Il Paik	Will our government or environmentalists answer our questions and provide help regarding "our" impact? Doubtful, because it is obvious that our opponents have an agenda and best interest to destroy our fishing industry.	The comment is an observation.
P106n	written - Jong Il Paik	Can our government or environmentalists who support the closure, provide a subsidy to fishers for financial losses during the closure months? Very doubtful.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P107	ORAL		
P108a	written - Sheila Nakagawa	I don't agree with NMFS' preferred alternative for shutting down the longline in the spring months. NMFS observers have already recorded that there are only rare turtle interactions with *ahi* longline and certainly not enough to justify shutting down the fishery.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.
P108b	written - Sheila Nakagawa	Winter and spring are the seasons that our crew and we usually try to save as much money as possible to get by in the summer slow season. Without these two months of fishing, I can't even begin to think what might financially happen to our family and our crew's family.	A new Preferred Alternative (Alternative 10) has been developed which is compliant with measures contained in the Pelagics BO, the STAL BO and the Prohibition on Shark Finning, and which allows year-round tuna longline fishing in some areas.

Tracking No.	Commenter	Comment	Response
P109a	written - David Burton (Dept of State)	Chapter 5, section 5.10.1. The DOS has serious reservations about the current drafting of Part 3 of this Section. The chapeau of Section 5.10.1 identifies this section as listing "some of the possible ways in which unavoidable adverse effects of the alternatives might be mitigated. *No attempt has been made define specific and detailed programs for implementation of any of the possible mitigation measures* [emphasis added]." In fact, Part 3 of this section outlines in significant detail how an eco-labeling program for "sea turtle safe swordfish" could be established and implemented, including the types of criteria that would have to be met by "qualified fisheries." Part 3 further outlines what would constitute an unqualified fishery and what the penalty could be (i.e., a loss of access to the U.S. market or market demand).	Agree - text has been rewritten.
P109b	written - David Burton	This section combines two distinct concepts: eco-labeling and government-imposed import restrictions based on environmental concerns. In our view, market-driven measures, such as eco-labeling, should be discussed in this document in only the most general terms. The issue of eco-labeling is currently under consideration in a number of international fora, and many of the issues associated with the use of such measures are still being developed. Furthermore, the unilateral use of such labels or other trade measures (such as import prohibitions) to restrict U.S. markets has had significant implications for U.S. foreign policy and has resulted in actions under the GATT, and in the WTO.	Agree - text has been rewritten.
109c	written - David Burton	Therefore, the DOS requests that this section be re-drafted to: (1) strengthen the bilateral, multilateral, and international efforts section (Part 1) and (2) include a reference to only the possibility of market-driven mitigation measures or import prohibitions.	Agree - text has been rewritten.
109d	written - David Burton	Part 1 should be expanded to include a description of multilateral actions that could be taken through the appropriate regional fisheries management organizations or commissions and to the bycatch provisions of the UNFSA and the FAO Code of Conduct for Responsible Fisheries.	Agree - text has been rewritten.
109e	written - David Burton	Part 3 should only identify market-driven measures as an approach the market or consumers themselves might take, disassociated with any U.S. government initiative. The new Administration has not yet reached agreement on this issue and thus such measures should not be advocated as a possible mitigation measure in a U.S. Government document.	Agree - text has been rewritten.

Tracking No.	Commenter	Comment	Response
P109f	written - David Burton	In addition, Part 3 should distinguish between eco-labeling initiatives and federal regulations that would restrict imports. Any discussion of possible import prohibitions should be general and note that unresolved issues remain concerning the efficacy of such prohibitions and their consistency with U.S. obligations under international trade rules.	Agree - text has been rewritten.
P109g	written - David Burton	Finally, we recommend that the Office of the U.S. Trade Representative be given the opportunity to examine this section before it is finalized.	Once the Final EIS is published, there is a thirty day comment period before the Record of Decision is published.
P109h	written - David Burton	Chapter 1, p20. In the paragraph that describes the recently concluded MHLC negotiations, the text should read (seventh line from the bottom): "The seventh and final meeting was held in Honolulu in September 2000, where the participants voted to adopt the Convention."	The suggested changes have been made.
P109i	written - David Burton	Chapter 1, p20. In the paragraph that describes the recently concluded MHLC negotiations, the text should read (seventh line from the bottom): "The Preparatory Conference, scheduled for 2001, will draft the rules, regulations, and procedures that will govern the functioning of the Commission, once the Convention enters into force."	The suggested changes have been made.
P109j	written - David Burton	Chapter 4, p192 (continuation of Section 4.11.7.2.5). In the final paragraph of Section 4.11.7.2.5, the second sentence should read: "These less restrictive alternatives, however, will leave more of Hawaii's fishers active in the fishery and consequently stimulate less activity by [delete "unregulated"] fleets elsewhere [insert] that are not required to use fishing methods that reduce sea turtle mortality." Please also make this change in Section 4.11.7.3 where "unregulated fisheries" is used again in the last sentence.	The suggested changes have been made.
P109k	written - David Burton	Chapter 4, p206 (Section 4.11.9.5). In the first paragraph, the last sentence should read: "Adverse transferred effects can also result as the market shifts from a declining domestic supply to an increased reliance on imported swordfish supplies from areas with [delete "questionable"] [insert] unknown [delete resource] [insert] protected species monitoring and management efforts."	This change has been made.

Tracking No.	Commenter	Comment	Response
P110a	written - David Farrell (EPA)	EPA commends the comprehensive, ecosystem-based approach taken by NMFS to analyze and improve the fishery. We strongly advocate an approach which addresses the entire ecosystem, managing for sustainable fisheries and naturally functioning systems. We are pleased the NMFS has provided substantial information in the DEIS on the environmental, economic and social impacts of alternatives for managing the Western Pacific Pelagic fishery.	The comment is appreciated.
P110b	written - David Farrell	EPA recognizes the significant challenges in managing a complex international resource, and balancing the environmental, social and economic demands. We also recognize that there is inadequate scientific information available to decision makers regarding the highly variable, environmentally sensitive species of the pelagic fisheries ecosystem. As such, we recommended management alternatives which take a conservative approach to fishing practices and liberally estimate their impacts, and are pleased that the preferred alternative identified by NMFS takes this approach.	The comment is appreciated.
P110c	written - David Farrell	We also recommend that a research component, such as the ones outlined in Alternative 9 and Option A, be incorporated into the preferred alternative in the FEIS.	At this time, Option A is not a part of the preferred alternative, but NMFS will attempt to permit and conduct this fishing experiment.
P110d	written - David Farrell	We have several unresolved concerns about impacts of proposed actions due to a lack of critical information in the DEIS. As such, we have rated this DEIS as category EC-2, Environmental Concerns - Insufficient Information.	Comment noted. Additional information is being supplied in the Final EIS.
P110e	written - David Farrell	In particular, we are disappointed that the ESA BO of sea turtles for the longline fishery in Hawaii was not completed and included in the DEIS. Not including the BO in the DEIS compromises the extent and quality of information available to decision makers and the public in reviewing the alternatives.	The EIS incorporates the Pelagics BO.
P110f	written - David Farrell	In addition, the DEIS lacks adequate description of the relationship between this comprehensive evaluation and similar ongoing or future activities in other related fisheries, such as the recently released Amendment 9 for this WP Pelagics Fishery, the Coral Reef Ecosystem FMP, the FMP for Pacific Coast highly migratory species. There are direct and indirect linkages between these activities and further discussion of their coordination should have been provided in the DEIS.	The preparers of the FMP for Pacific Coast highly migratory species were contacted and asked to provide information for inclusion in this EIS. However, their draft document was still undergoing revision, and no specifics were yet available. Discussions of the other listed documents have been integrated into the EIS. Note that the Council's draft Amendment 9 was revised at the recent Council meeting to bring the amendment into conformity with the recent federal ban on shark finning.

Tracking No.	Commenter	Comment	Response
P110g	written - David Farrell	Lack of Information Regarding Biology/Ecology of Pelagic and Associated Species. Through the DEIS, NMFS acknowledges and attempts to address the lack of information on many of the pelagic ecosystem species evaluated under this FMP. The Agency acknowledges, and EPA agrees, that sound scientific information about population size and recruitment is lacking for many pelagic fisheries and other species associated with this ecosystem, including the four species of sea turtles (leatherback, loggerhead, green, olive ridley) and two species of albatross (laysan and black footed) under the domain of this FMP.	NMFS acknowledges that there is a need for more scientific information about the species evaluated under this FMP.
P110h	written - David Farrell	No ESA BO for Sea Turtles included in the DEIS. EPA is concerned that a BO for the sea turtles which have known interactions with the Hawaii longline fishery was not completed and included in the DEIS. NEPA explicitly states that federal agencies should integrate and coordinate NEPA and ESA procedures during the DEIS stage. While an excerpt of the Pacific Coast BO for CA/OR Drift Gillnet Fishery covering the same species of sea turtles was included in the appendix, EPA believes it does not provide adequate analysis for the impacts of the longline fishery and these species in the WPR. The fishery types differ and, based on information provided elsewhere in the DEIS, the level of interaction with protected species appears to be different in the Hawaii longline fishery. Given that the previous 1998 BO was the focal point for litigation which preceded this comprehensive evaluation of the pelagic fishery, we think it is critical that the BO be completed and included at the draft stage.	EIS includes information from the Pelagics BO.
P110i	written - David Farrell	Recommendation: If the BO, when completed, contains information which will have a bearing on the proposed action or its environmental impacts, then NMFS should circulate it as a supplement to the DEIS pursuant to 40 CFR 1502.9 (c)(1)(ii) and 1502.9 (c)(4) before completing the FEIS.	Information in the Pelagics BO has been incorporated into the Final EIS.

Tracking No.	Commenter	Comment	Response
P110j	written - David Farrell	Lack of Research Component in preferred alternative. As noted above, there is a lack of scientific information available about target pelagic fish species and other related species in this ecosystem. In order to manage our fisheries in a sustainable manner, and protect populations of threatened and endangered species, we should make every effort to conduct research which provides more accurate information on population size, recruitment, and viability of these species, as well as research on impacts from interactions among fisheries and with protected species. Alternative 9 proposes some research, but focuses only on catch interactions among pelagic fisheries. A broader research effort on population biology of target, protected and other keystone species in the pelagics fishery would be more appropriate. An additional "Option A" is presented in the DEIS which would develop a planned experimental fishery geared toward evaluating the effectiveness of innovative gear and techniques to avoid sea turtle takes. While there is a risk that this approach could have short-term negative impacts on protected species, the information provided and the potential transferability of effective techniques to other fisheries could have a significant beneficial effect for protected species worldwide.	Alternative 9 was formulated to address the specific issue of competition for resources among pelagic fisheries. There are numerous ongoing research efforts by NMFS, academic scientists, and NGOs aimed at the population biology of target, non-target and protected species. What has not yet been effectively focused on is measures to deter interactions of sea turtles with the longline fishery. Although, not part of the preferred alternative, the narrowly-focused fishing experiment developed herein as Option A.
P110k	written - David Farrell	Recommendation: Both a research and experimental fishery component should be included in a final preferred alternative.	Although it is not part of the preferred alternative, there is included in the EIS a narrowly-focused fishing experiment developed as Option A.
P110l	written - David Farrell	Coordination with Related Ongoing/Future FMPing Activities. NMFS has several ongoing or planned evaluation efforts in this or related fisheries, which have not been significantly discussed in the DEIS. Amendment 9 for this particular WP Pelagics fishery was just released for review, a DEIS for the counterpart pelagics fishery on the Pacific Coast is currently being completed, and a DEIS for the WP Coral Reefs FMP has just been released. There are numerous direct and indirect linkages and impacts among management alternatives for these fisheries. The DEIS does not adequately address the relationship of this comprehensive evaluation to the other ongoing and planned activities.	The preparers of the FMP for Pacific Coast highly migratory species were contacted and asked to provide information for inclusion in this EIS. However, their draft document was still undergoing revision, and no specifics were yet available. Discussions of the other listed documents have been integrated into the EIS. Note that the Council's draft Amendment 9 was revised at the recent Council meeting to bring the amendment into conformity with the recent federal ban on shark finning.
P110m	written - David Farrell	Recommendation: The FEIS should include a thorough discussion of the connection between alternatives under this FMP and other related fisheries in the Pacific Coast and WPR.	With the exception of information on the FMP for Pacific Coast highly migratory species, which was unavailable to the authors of this document, the EIS includes information on relevant concurrent FMPs, biological opinions, executive orders, federal and state laws and regulations, and their interrelationships with the various alternatives analyzed herein.

Tracking No.	Commenter	Comment	Response
P110n	written - David Farrell	NMFS has addressed many of social, cultural and economic impacts on affected fishing communities of the various management alternatives presented in the DEIS. However, there is no significant discussion of previous or planned efforts to involve the public, native Hawaii groups, or the other communities primarily affected, in identifying, reducing and mitigating impacts on any one segment of the community. The Vietnamese American fishing community in particular will be impacted by the preferred alternative which essentially eliminates the Hawaii longline swordfishery.	The impact of closure of the Hawaii-based longline fishery targeting swordfish on the Vietnamese American fishing community is discussed in the EIS in Sections 311 and 4.9.
P110o	written - David Farrell	Recommendation: NMFS should undertake extensive public outreach and collaboration with respective governments of the U.S. Pacific Islands, all potentially affected communities, and other interested local, private, state and federal entities before completing its FEIS.	NMFS is cognizant of responsibility and works to maximize opportunities through the Council and public scoping and comment periods and on-site hearings. Twelve such public hearings were held on the Draft EIS, in various locations of the Hawaiian Islands, the Territories of American Samoa and Guam, and the Commonwealth of Northern Marian Islands.
P111a	written - Patricia Sanderson Port (Dept of Interior)	The DEIS is deficient in assessing effects of the proposed action on certain fish and wildlife resources. In addition, the DEIS does not propose mitigation measures commensurate with the range of potential adverse impacts anticipated to result from the proposed actions. As a result, we believe that the deficiencies in the DEIS preclude its use as a basis for meaningful analysis of anticipated project-related impacts to fish and wildlife resources identified in these comments. Therefore, we recommend that the DEIS be revised to include more complete information on the proposed action, an alternative analysis/impact assessment based on a commitment to avoid and minimize project-related impacts, and proposed mitigation measures that minimize unavoidable impacts and compensate for significant unavoidable impacts.	Without a more specific list of the "certain fish and wildlife resources" deemed inadequately analyzed, a specific response cannot be formulated. The rationale for the very broad range of alternatives analyzed was to examine the effectiveness of mitigation of impacts to protected species represented by a range of restrictions on fishery participants, particularly time and area closures and seabird interaction deterrent measures. The EIS provides a better summarization of environmental impacts of the pelagic fisheries in the western Pacific region and the respective mitigation measures proposed to minimize those impacts. Additionally, the Preferred Alternative of the EIS incorporates recommended measures of the STAL BO, the Pelagics BO and te Congressional Prohibition on Shark Finning.

Tracking No.	Commenter	Comment	Response
P111b	written - P S Port	Fish and Wildlife Coordination Act and National Migratory Bird Act. U.S. pelagic fishing activities have been documented to adversely affect fish and wildlife resources that occur both within and outside the National Wildlife Refuges (NWR) managed by the Deptment in the Pacific. The DEIS fails to thoroughly describe the DOIs trust resources and document fishery-related impacts to those resources. NWRs in the Pacific region (see attachment for NWR descriptions) that support enormous numbers of nesting migratory seabirds and are potentialongliney affected by the Pelagic FMP include: Hawaiian Islands NWR, Midway Atoll NWR (NWHI); Baker Island NWR, Howland Island NWR, Jarvis Island NWR, Johnston Atoll NWR, Palmyra Atoll NWR, Kingman Reef NWR (Central Pacific); Rose Atoll NWR (American Samoa); Guam NWR (Territory of Guam).	Thank you for providing this information. It has been incorporated into the EIS.
P111c	written - P S Port	ESA. The NWRs provide breeding habitat for federally listed endangered Hawaii monk seals and nesting habitat for threatened green sea turtles. The NWRs provide forage and shelter habitat for migratory shorebirds and federally listed endangered short-tailed albatrosses, endangered hawksbill sea turtles, and endangered leatherback sea turtles. NWRs also contain rich coral-reef ecosystems that support hundreds of species of reef fishes, algae, and thousands of species of invertebrates.	Comment noted.
P111d	written - P S Port	NWR Administration Act. The DEIS does not discuss the NWR Administration Act of 1966, as amended. The DEIS does not analyze how that law may affect implementation of the proposed Pelagic FMP. Similarly, the DEIS does not discuss various EOs that give the Deptment-specific instructions for managing waters of previously mentioned NWRs. Lacking a clear discussion of marine boundaries may lead to confusion and negatively impact federally protected resources that occur within these NWRs. We recommend that a revised DEIS analyze the proposed action and its compatibility with the primary purpose or purposes for which NWRs were established and the mission of the NWR System. We also recommend that a revised DEIS also analyze impacts of pelagic fishing on NWHI Coral Reef Ecosystem Reserve, as established by EOs 13178 and 13196.	Discussions of these laws and EOs have been expanded in the EIS. There is currently disagreement among agencies on respective jurisdictions in some marine areas. A "clear" discussion will still not resolve these ambiguities.

Tracking No.	Commenter	Comment	Response
P111e	written - P S Port	Also, NMFS has estimated that Hawaii longline fishing operations have resulted in mortalities to seabirds. Between 1994 to 1999, NMFS estimates about 8300 BF albatrosses and 7050 LA albatrosses were killed as a result of interaction with Hawaii longline fishing gear. The 95 percent confidence bounds for this estimation indicate that mortalities may range between 6681-10,213 for BF albatrosses and between 4956-9838 for LA albatrosses. Both the BF albatrosses and LA albatross are afforded protection under the MBTA. We recommend that the DEIS be revised to include a discussion of plans to begin implementing conservation measures into the Hawaii longline fishery to prevent violations of the MBTA.	NMFS and other agencies interpret the MBTA to apply only within the 3nm territorial waters, not out to the limits of the 200 nm EEZ, and not on the high seas. The STAL BO mandates use of several seabird interaction deterrents, and these have been made a part of the new preferred alternative, Alternative 10.
P111f	written - P S Port	In the Short-tailed Albatross BO, the FWS estimated that 15 short-tailed albatross may be taken during the seven-year period addressed in this consultation, based on an estimate of 2.2 birds taken per year from 2000 through 2006, as a result of the Hawaii longline fishing activities regulated by NMFS. The incidental take is expected to be in the form of morality or injury. We are especially concerned that the DEIS does not analyze the level of risk that the Hawaii longline fishery poses to the endangered short-tailed albatross. The DEIS does not discuss data and analyses presented in the BO. Furthermore, the DEIS does not discuss the mandatory Terms and Conditions of the BO to minimize attraction of short-tailed albatross to fishing gear used by the Hawaii longline fishery, monitor the level of take and measures to minimize take, and ensure the survivability of injured short-tailed albatrosses. We recommend that a revised DEIS discuss data, analyses, and the Terms and Conditions presented in the BO, so that the best methods may be considered to reduce interaction with Hawaii longline gear and avoid adverse impacts to endangered short-tailed albatross.	The STAL BO was unavailable at the time of the Draft EIS. It has been incorporated into the alternatives, as appropriate, in the Final EIS.

Tracking No.	Commenter	Comment	Response
P111g	written - P S Port	We believe the DEIS does not accurately portray all Hawaii longline fishing operations-related adverse impacts to migratory seabirds when estimating mortality for BF and LA albatross. We believe that a larger number of seabirds may actually be injured or killed during fishing-related operations, but that these impacts are not documented by NMFS. NMFS has indicated that at the time when fishing gear is deployed, baited hooks present a lethal target for seabirds. Hooks are deployed for several hours, at depth, and if a seabird is hooked, it is likely to be drowned. NMFS bases its mortality estimate of seabirds on birds that are counted when fishing gear is retrieved. However, hooked birds may “fall-off” the fishing gear as they are subjected to gear deployment operations, currents, predation, or cut-off by fishers during gear retrieval operations. Birds that may be hooked, but fall off fishing gear, are not included in NMFS’ mortality estimate for seabirds. Therefore, we recommend that the revised DEIS include a discussion of the rate seabirds may fall off from fishing gear. The DEIS should discuss how NMFS intends to collect this information to estimate adverse impacts in the future. Documenting adverse impacts to seabirds will help the NMFS and the FWS gauge the effectiveness of seabird deterrent devices and, ultimately, help reduce the risk of interaction between short-tailed albatross and Hawaii longline gear.	The EIS was revised to include a higher mortality rate for hooked birds.

Tracking No.	Commenter	Comment	Response
P111h	written - P S Port	The DEIS fails to adequately assess past and potential future impacts of fishing vessel groundings on the DOI's trust resources. For instance, since 1998, two federally permitted Hawaii longline vessels have run aground on coral reefs located within the NWHI. The F/V Paradise Queen No. 2 ran aground on the coral reefs at Kure Atoll, State of Hawaii (October 1998), and the F/V Swordman 1 ran aground on the coral reefs at Pearl and Hermes Atoll, Hawaii Islands NWR (May 2000). The F/V Swordman 1 was removed from the reef and scuttled in deep water before the vessel deteriorated, resulting in only minor physical impacts to the reef and moderate risks of exposure of petroleum products to wildlife. The removal of this wreck was expedited because of the immediate risk it posed to endangered Hawaii monk seals observed swimming in the vicinity of the wreck, migratory seabirds and coral reef resources that occur within the refuge. The cost to the Federal government in terms of financial resources to remove and scuttle the wreck was an expenditure of $1,688,591 (USCG - Marine Safety Office - Honolulu, HI). The F/V Paradise Queen No. 2 broke apart on the reef margin at Kure Atoll (a designated State of Hawaii Wildlife Sanctuary), risking exposure of released petroleum products and fishing gear to monk seals, sea turtles, migratory seabirds, and marine organisms. Substantial physical damage to the reefs resulted from the initial impact, as well as from subsequent vessel movement on the exposed windward side of the atoll. Today the wreck is scattered on the reef, and continued risks to coral reefs in the immediate vicinity are not well understood. However, it has been documented that elevated iron in the water column resulting from the decay of a vessel's hull (e.g., F/V Jin Shiang Fa grounding at Rose Atoll NWR) contributes to an artificial increase in the development of blue-green algal mats. Large concentrations of blue-green algae are capable of degrading corals and disrupting the entire benthic community equilibrium within the affected area.	Comment appreciated. The NEPA analysis identifies and analyzes effects of a range of alternatives, including the status quo, on the human environment. Fishing vessl groundings are included in the discussion of marine pollution. As infrequent occurances they are not the focus of concentrated analysis.

Tracking No.	Commenter	Comment	Response
P111i	written - P S Port	The DEIS lacks a discussion of how NMFS plans to prevent introductions of terrestrial and marine alien species spread by transportation-related activities and vessel groundings, especially at remote island sites within the NWRs. Introduction of alien species is one of the greatest threats to the biological health of NWRs in the Pacific. Invasive aliens, such as rats or marine organisms carried in ballast water or attached to the hull of ships, can potentially out-compete and eliminate many native species. The Department recommends that the revised DEIS address this threat and discuss detailed measures for preventing the spread of alien species on refuge lands and waters, including how alien species would be eradicated in the event of accidental introductions.	The accidental introduction of alien species through ballast water or attached to ships is not considered a serious threat. The majority of vessels governed by the FMP are based locally and are subject to State Department of Agriculture regulations.
P111j	written - P S Port	Also, in light of EOs 13178 and 13196 (NWHI Coral Reef Ecosystem Reserve) and 13089 (Coral Reef Protection), the Department is very concerned about adverse impacts to coral reef resources that have resulted from federally permitted fishing vessel groundings in the NWHI. We recommend that the revised DEIS discuss how vessel groundings may be reduced or eliminated from occurring in the NWHI in future. We suggest that "safe transit corridors" be designated that allow fishing vessels to transit between NWHI in a manner that reduces or eliminates accidental groundings. If future vessel groundings are an unavoidable consequence of these activities, we recommend that the revised DEIS discuss mitigation as a possible consequence for adversely impacting federally protected resources.	Comment appreciated. The NEPA analysis identifies and analyzes effects of a range of alternatives, including the status quo, on the human environment. Fishing vessl groundings are included in the discussion of marine pollution. As infrequent occurances they are not the focus of concentrated analysis.
P111k	written - P S Port	es-4: ES.1.3 - Alt, para 3 : DEIS states "Alt & require Hawaii-based vessels to use line-shooters and/or weighted branch lines to set longline gear & close all areas to longline fishing by the Hawaii-based vessels during April & May every year; pending actions from Alternative 2." Preferred alternative is not consistent with mandatory Terms & Conditions in the BO. We recommend mandatory Terms & Conditions contained within BO be incorporated in revised DEIS.	Agree - STAL BO Rerms and Conditions have been incorporated into the EIS.
P111l	written - P S Port	ES-6: ES.3, Para 4: DEIS discusses seabird population sizes affected by Hawaiian longline fishery, neglects to include endangered short-tailed albatross in discussion. Recommend discussion of size of short-tailed albatross population be incorporated into this section. Refer to BO that was communicated to NMFS on 11/29/00.	Agree - This has been done.

Tracking No.	Commenter	Comment	Response
P111m	written - P S Port	ES-11: ES.2: Recommend short-tailed albatross be included in table, separate row, direct/indirect & cumulative effects of alternatives under consideration be summarized accordingly.	Agree - This has been done.
P111n	written - P S Port	Pg 1-9: 1.2.2, para 1, sent 5: DEIS states, "The provisions focus on swordfish fishing because this gear - in contract to tuna gear - is set at shallower depths & at night, thereby presenting a greater hazard to sea turtles." We have not reviewed data or reports that support the statement that sea turtles risk a greater chance of interacting with fishing gear when swordfish fishing operations are conducted at night compared to operations occur during day. Based on data made available to us in the DEIS, we believe the depth at which fishing gear is set may be a greater contributing factor toward fishing gear interaction with sea turtles than time of day. Recommend the revised DEIS fully/clearly document this statement as it may influence the Department's future recommendations concerning management alternatives. If claim is scientifically unsubstantiated, we recommend this statement be removed.	The suggested changes have been made.
P111o	written - P S Port	Pg 1-26: 1.4.4, para 1, last sent: DEIS states the BO is still in preparation. BO was finalized on 11/28/00. Recommend revised DEIS reflect date on which BO was finalized.	The suggested changes have been made.
P111p	written - P S Port	Pg. 2-3: 2.1, para 1: DEIS mentions EEZ, but does not discuss inner boundaries of EEZ differ for various locations mentioned in this para. Without clear understanding of inner boundaries, area in which the Pelagics FMP applies to federally permitted fishing vessels is left in question. Therefore, recommend DEIS indicated in this section the inner boundaries of the EEZs for following locations: American Samoa, Guam, CNMI, State of Hawaii & NWRs previously mentioned in this communication.	The suggested changes have been made.
P111q	written - P S Port	Pg. 2-3: 2.2 Description of Alt: This section does not consider or discuss the endangered short-tailed albatross in any of proposed alternatives. We consider DEIS, in its current form, to be incomplete. Therefore, we recommend a revised DEIS analyze potential adverse impact to endangered short-tailed albatross for each proposed alternative.	The suggested changes have been made.

Tracking No.	Commenter	Comment	Response
P111r	written - P S Port	Pg 2-5: 2.2.1 Alt No 1, para 1, sent 2: DEIS states "There are no other regulations currently in place for domestic pelagic fishing activities in those areas." The Naional Wildlife Refuge Admin Act of 1966, as amended, applies to and precludes conduct of, commercial pelagic fishing activities within marine boundaries of previously stated NWRs. Recommend this statement be removed as it suggests no other Federal regulations apply to marine environment around U.S. Pacific Island areas, which is not so.	The suggested changes have been made.
P111s	written - P S Port	Pg. 2-8: 2.2.2 Alt 2, para 1: DEIS describes protected species workshop to be conducted by NMFS for Hawaii-based longline vessel owners & captains. DEIS discusses procedures for handling/releasing sea turtles. However, document does not mention similar protocols for handling/caring for health of fishery-related injured endangered short-tailed albatross. Recommend this section acknowledge vessel owners/captains will receive similar instructions for caring/handling injured short-tailed albatross at mandatory protected species workshops.	The suggested changes have been made.
P111t	written - P S Port	Pg 2-9: 2.2.2 Alt 2, para 1, sent 1: DEIS states "The Council has proposed area adjustment to Pelagics FMP that would require Hawaii-based longline vessel operators to use at least two seabird deterrents they choose from list of options when fishing north 25 degrees north latitude." Presentation of these options as alternatives gives the reader impression these options may be considered as potential management alternatives. We do not consider these to be management alternatives as they fall short of mandatory Terms & Conditions stated in 11/28/00, BO. Recommend mandatory Terms & Conditions of this BO be incorporated into revised DEIS.	The suggested changes have been made.
P111u	written - P S Port	p2-9, Para 2, Sent 3: DEIS states "Measures included in this BO are not reflected in this DEIS, but will be included in the Final EIS." Recommend the revised DEIS not only include mandatory Terms & Conditions of the BO, but also include data & analyses contained within BO, where appropriate. Revised DEIS will offer us opportunity to ensure accuracy & quality of information pertaining to endangered short-tailed albatross.	The suggested changes have been made.

Tracking No.	Commenter	Comment	Response
P111v	written - P S Port	p2-9, Para 3, Sent 1: DEIS states, "Tuna fishers would be required to:...or (b) if deploying Japanese tarred mainline with basket-style branch lines, use weighted branch lines that have at least 45g of weight attached within one meter of the hook." This style of fishing gear has not been tested for its effectiveness as a seabird deterrent. Furthermore, this method of fishing was not evaluated in the BO or included in the mandatory Terms and Conditions. Therefore, we recommend that you remove "Japanese tarred mainline with basket-style branchlines" from consideration as an alternative.	The suggested changes have been made.
P111w	written - P S Port	p2-9, para 4, sent 1: The DEIS states, "Swordfish and mixed target fishers would be required to: ...(a) use a line-setting machine with weighted branch lines that have at least 45g of weight attached within one meter of the hook." This style of fishing gear has not been tested for its effectiveness as a seabird deterrent for swordfish and mixed sets. Furthermore, this method of fishing was not evaluated in BO or included in mandatory Terms & Conditions. Therefore, we recommend that you remove "line-setting machines with weighted branch lines that have at least 45g of weight attached within one meter of the hook" from consideration as alternative.	The suggested changes have been made.
P111x	written - P S Port	Pg 2-12: 2.2.4 Alt 4: Close areas north of 29 N latitude from July thru January of every year to longline fishing by Hawaii-based fishery, Para 3: DEIS presents option that "Requires Hawaii vessel operators to use at least two seabird deterrents when longline fishing north of 25 degrees (or 23 degrees) No. latitude (or prescribe different sets of measures for swordfish and tuna-directed section of fishery). Some of same deterrents (e.g., blue-dyed bait, use of a line-shooter, weighted branch lines) would be expected to achieve further reductions in sea turtle takes below level of reduction that would be expected to results from proposed time/area closure." This alternative is not consistent with Terms & Conditions of BO, we recommend it be revised in next DEIS to conform to mandatory Terms & Conditions of BO.	The suggested changes have been made.

Tracking No.	Commenter	Comment	Response
P111y	written - P S Port	Pg 2-13: 2.2.5 Alt 5, para 3: DEIS states NMFS will "Require Hawaii vessel operators to use at least two seabird deterrents when longline fishing north of 25 degrees (or 23 degrees) north latitude (or prescribe different sets of measures for swordfish and tuna-directed sectors of fishery). Some of same deterrents (e.g., blue-dyed bait, use of line-shooter, weighted branch lines) would be expected to achieve further reductions in sea turtle takes below level of reduction that would be expected to result from proposed time/area closure." This alternative is not consistent with Terms & Conditions of BO and we recommend it be revised in next DEIS to conform to mandatory Terms & Conditions of BO.	The suggested changes have been made.
P111z	written - P S Port	Pg 2-14: 2.2.6 Alt 6, para 3: DEIS states NMFS will "Require Hawaii vessel operators to use at least two seabird deterrents when longline fishing north of 25 degrees (or 23 degrees) north latitude (or prescribe different sets of measures for swordfish and tuna-directed section of fishery). Some of same deterrents (e.g., blue-dyed bait, use of line-shooter, weighted branch lines) would be expected to achieve further reductions in sea turtle takes below level of reduction that would be expected from proposed time/area closure." This alternative is not consistent with Terms & Conditions of BO, we recommend be revised in next DEIS to conform to mandatory Terms & Conditions of BO.	The suggested changes have been made.
P111aa	written - P S Port	Pg 2-15: 2.2.7 Alt 7, para 3: DEIS states NMFS will require Hawaii vessel operators to use at least two seabird deterrents when longline fishing north of 25 degrees (or 23 degrees) north latitude (or prescribe different sets of measures for swordfish and tuna-directed sections of the fishery). Some of same deterrents (e.g., blue-dyed bait, use of line-shooter, weighted branch lines) would be expected to achieve further reduction in sea turtle takes below the level of reduction that would be expected to result from proposed time/area closure." This alternative is not consistent with Terms & Conditions of BOP, recommend be revised in next DEIS to conform to mandatory Terms & Conditions of BO.	The suggested changes have been made.

Tracking No.	Commenter	Comment	Response
P111bb	written - P S Port	Pg 2-16; 2.2.8 Opt A: Section describes experimental measures could be tested to determine their effectiveness as measures to reduce interaction between Hawaiian longline fishing gear and sea turtles. Recommend these measures be evaluated for their consistency with mandatory Terms & Conditions of BO when testing these measures above 23 degrees north latitude after 4/15/01, when BO is implemented by NMFS. Also recommend revised DEIS discuss experimental measures that could be tested and considered to reduce interactions with seabirds and Hawaiian longline fishing gear.	The suggested changes have been made.
P111cc	written - P S Port	Pg 2-32: 2.3.8, para 2, sent 4: DEIS states "these average annual incidental catches represent about 0.6% of estimated black-footed & Laysan albatross populations respectively." Do not concur with this estimation since it is based, in part, on NMFS's annual mortality estimates for black-footed & Laysan albatross. We believe the NMFS annual mortality assessment may significantly underestimate number of seabirds might be killed because does not factor in rate at which birds "fall-off" from fishing gear. Recommend data be presented in terms of minimum percent of black-footed & Laysan albatross populations that are adversely affected.	The suggested changes have been made.
P111dd	written - P S Port	p2-32, Para 2, sent 5: DEIS states "an estimated 70 percent of incidental longline catch of Laysan albatross & estimated 80 percent of incidental longline catch of black-footed albatross are mortalities." We believe a representation of composition of seabirds killed in fishery could be underestimated since fall-off rate is not incorporated into this assessment. Also, rate of mortality for birds that have ingested hooks is likely to be high. Recommend data be represented in terms of minimum percent of composition of black-footed and Laysan albatross may be killed by fishery-related activities. Recommend rate of seabird fall off from fishing gear and post-hooking mortality be discussed in revised DEIS.	The suggested changes have been made.
P111ee	written - P S Port	Pg. 2-38:2.4.2, Table 2-7, Disc. Column: DEIS states "If setting gear at night is mandatory, strategic offal discharge would be rendered ineffective." For Hawaii longline fishery, no data exist that support this statement with regards to endangered short-tailed albatross. Recommend this statement be removed from DEIS.	The suggested changes have been made.

Tracking No.	Commenter	Comment	Response
P111ff	written - P S Port	p2-38 Table-Row B, disc. Column: DEIS states "If setting gear at night is mandatory, strategic offal discharge would be rendered ineffective." For Hawaii longline fishery, no data exist support this statement with regards to endangered short-tailed albatross. Recommend statement be removed from DEIS.	The suggested changes have been made.
P111gg	written - P S Port	Pg 3-4: 3.2.2, para 1, sent 2: DEIS states "The increased level of biological productivity in these zones attracts higher tropic-level predators such as swordfish, tunas, seabirds and sea turtles and ultimately a complete pelagic food web is assembled."	The comment restates a portion of the DEIS. No response required.
P111hh	written - P S Port	p3-4, Para 3, sent 1: DEIS states "These frontal zones have also been found to be likely migratory pathways across Pacific for loggerhead turtles." We understand these biologically rich zones, such as Kuroshiro Current, extend across Pacific and support higher assemblages of organisms, such as sea turtles, may use these zones as pathways to migrate across Pacific. DEIS states "Based on genetic analysis of DNA of loggerhead turtles encountered in Hawaii-based longline fishery, majority are derived from Japanese nesting populations. Possible short-tailed albatrosses use same pathways to migrate from primary breeding colony at Torishima, Japan to northwestern Hawaiian islands? Recommend revised DEIS evaluate/discuss possible migration of short-tailed albatross across Pacific via "Frontal zone pathways" that appear to be used by other migratory organisms.	This will be discussed in the Short-tailed albatross section.
P111ii	written - P S Port	Pg 3-104(a): 3.7.1, para 4, sent 1: Suggest replaced first sent with "Hawaii-based longline fisheries result in annual mortality of thousands of protected black-footed and Laysan albatrosses that next on northwestern Hawaiian islands." Also suggest adding "A third species of albatross, short-tailed albatross, also forages in area affected by these fisheries and has been shown to be extremely vulnerable to mortality in longline fisheries in other part of world.	The change has been made.
P111jj	written - P S Port	p3-104(a), Para 4, sent 4: Suggest replacing sentence beginning with "Neither" with "Neight the black-footed nor the Laysan albatross is listed under the U.S. ESA, but both are protected under U.S. MBTA and black-footed albatross is listed as Vulnerable on IUCN Red List of Threatened Animals. Short-tailed albatross is listed as Endangered in all parts of its range under U.S. ESA.	The change has been made.

Tracking No.	Commenter	Comment	Response
P111kk	written - P S Port	Pg 3-105(a), para 1, sent 5: Suggest adding after last sentence, "Additionally estimates thought to be underestimate of actual mortality because do not account for those birds killed that fall from hook before lines are retrieved. This error can be as high as 30-95 percent (Gales 1998)."	This has been added to Chapter 3.
P111ll	written - P S Port	Pg 3-105(1), para 2: DEIS states "For purpose of EIS, NMFS has elected to provide/use statistical analyses that results in lower take estimates and corresponding overall reduced estimated impacts, especially for black-footed albatrosses." Appropriate estimate to use for conservation purposes is one producing higher estimates (non-log transformed data) if there are no compelling statistical reasons to use log transform in this case. This allows worst-case scenario to be evaluated and its impact assessed. Particularly when there are other reasons to believe the estimates of mortality are lower than actual take, the higher estimates should be used. Take estimates for black-footed and Laysan albatross are used to evaluate effectiveness of seabird deterrent devices with regards to reducing impacts to short-tailed albatross interactions with Hawaiian longline fishing gear. Rate which black-footed albatross are killed is factored into estimating number of short-tailed albatross that may be taken by Hawaiian longline fishery. It is U.S. Fish & Wildlife Service's policy during consultation with another agency to err on side of species, particularly when Federal action may adversely affect federally listed species. In this case, log transformed data may underestimate adverse impacts to black-footed and Laysan albatross. Recommend non-log transformed data be used to calculate mortality estimates for black-footed and Laysan albatross.	We have used the statistical treatment FWS found appropriate for use in the STAL BO.
P111mm	written - P S Port	Pg 3-105(a), para 4: Recommend paragraph be replaced. DEIS is misleading to report only those intervals of time which there was large increase in population. For each colony you should take difference between beginning & end of time series over which values have been collected in consistent standardized way. For French Frigate Shoals, using difference between 1980 & 2001. Longest time series for which there are consistently-collected data for largest colonies representing approximately 75 percent total world population presented in Figure 1. Population at these sites has declined from 48,413 pairs in 1992 to 43,781 pairs in 2001 indicating a decrease of about 10 percent.	Chapter 3 has been revised to include data for albatross colony size estimates as provided by FWS.

Tracking No.	Commenter	Comment	Response
P111nn	written - P S Port	Pg 3-106(a), para 3, sent 2: DEIS states "Data collected by NMFS observers show when Hawaii-based longline vessels target swordfish, incidental catch of seabirds is far higher than when vessels target tuna." We believe this information is helpful towards understanding differences for longline interactions with seabirds for different styles of fishing that occur in Hawaiian longline fishery. Recommend table be created that contains "bird catch/set" for swordfish, mixed, tuna sets for years between 1994-1999, by seabird species.	Information has been included in the EIS.
P111oo	written - P S Port	Pg 3-109(A0, table 3.7-1: Same table presented on page 2.7, numbers in Table 3.7-1 do not match numbers in Table 2.2. Recommend explain why numbers in these tables do not match.	Correction made.
P111pp	written - P S Port	Pg 3-109(a), para 1: DEIS states "NMFS observer data show fishery/seabird interactions regularly occur between Hawaii-based longline fishery and two species of albatross: black-footed and Laysan albatross. There have been no reports of interactions between endangered short-tailed albatross & Hawaii-based longline fishery, but could change in future as short-tailed albatross population continues to increase." Between 1994 & 1999, NMFS observers have covered average of 4.3 percent, or about 46 observed trips, for 1078 trips annually of all Hawaiian longline fishing trips to record fishery and protected species information. NMFS observers work about 10 hours/day and reserve enough time to observe about 10 percent of each set during tuna trips and 3 percent of each set during swordfish trips.	As a result of the current injunction, observer coverage has increased to over 20 percent. A minimum 20 percent observer coverage is mandated in the new Preferred Alternative, Alternative 10.
P111qq	written - P S Port	p3-109(a) par 1: Peak interaction period when seabirds interact with longline gear is during the set, although some interaction does occur during the haulback. At present very little time dedicated to looking for endangered short-tailed albatross during set when seabirds most likely to interact with longline fishing gear. Recommend statement to conditioned to reflect our concern although no interactions have been reported, does not mean interactions between endangered short-tailed albatross and Hawaiian longline fishing gear have not occurred, given level of unobserved risk that may exist.	Potential for under-reporting these interactions has been added to the text.

Tracking No.	Commenter	Comment	Response
P111rr	written - P S Port	Pg 3-111(1), Tbl 3.7.2: Table incomplete as represents basic population data for short-tailed albatross colony at Torishima, Japan from 1977 thru 1999. Furthermore, data represented in several columns are inaccurate or have been omitted. Recommend incorporate data contained in table "Short tailed albatross basic population data." Table can be found in BO, Attachment H. Table contains population information about short-tailed albatross colony at Torishima Island, Japan from 1947-1900. Also identifies year, number of birds observed, November colony count, eggs laid, young fledged, percent success and observer. Recommend you clearly identify these categories and associated data in revised DEIS.	Table has been clarified.
P111ss	written - P S Port	Pg 3-111(1), para 2, sent 1&2: Discrepancy in number of birds believed to be at Minami-Kojima colony. Please clarify. Is it 30 breeding adults as implied by number 454 or 30 pairs in revised DEIS?	30 breeding adults. Text has been clarified.
P111tt	written - P S Port	Pg 3-113(a), 3.7.1.1.2, para 1, sent 6: Unit of time over which population decline occurs would indicate vulnerable status is three generations for long-lived organisms such as seabirds. Black-footed albatrosses have generation time of 15 years, criterion for vulnerable status is a 20 percent decline over 45 years. Since there are not good census data from 45 yrs ago, IUCN evaluates average annual rate of decline over period of time that data do exist and extrapolates to 45 years. Ten-year period is used for short-lived species, not seabirds. Recommend these points be incorporated in revised DEIS.	IUCN criteria have been used as appropriate in estimating declines in relation to vulnerable status.
P111uu	written - P S Port	p3-113(a), Para 2, sent 1: DEIS states "Direct counts of active nests during egg stage have been completed for Midway Atoll from 1991 to 1999, Laysan Island from 1907 to 1999, French Frigate Shoals every year since 1979." Recommend you provide citation for source of this information.	Unpublished data were provided by FWS.
P111vv	written - P S Port	p3-113(a), Para 3: Criterion of 20 percent decline is for species population as whole, not colony by colony. Recommend revised DEIS omit this paragraph.	The text has been clarified. All available recent population data have been included in tabular form in Chapter 3.
P111ww	written - P S Port	Pg 3-114, fig 3.7.2: Recommend curve indicating population size of black-footed albatrosses at Laysan as measured by quadrant sampling (labeling extrapolated) should include confidence intervals for those estimates.	Quadrant sampling results were not available.
P111xx	written - P S Port	Pg 3-115(a) 3.7.1.1.3, para 2, sent 7: Recommend revised DEIS substitute "active nest" for "bird."	Suggested change has been made in the FEIS.

Tracking No.	Commenter	Comment	Response
P111yy	written - P S Port	Pg 3-117(a), 3.7.1.2, para 1, sent 1 & 2: Recommend revised DEIS add scientific names of booby species first time mentioned in test.	Done.
P111zz	written - P S Port	Pg 3-122 (a), 3.7.3.4, para 1, sent 3: DEIS states, "In addition to seabirds killed in fishing year, often certainly ancillary mortality of nestlings if adults provisioning young are killed in fishing gear and thereby unable provide sufficient food to sustain young at nest." Agree fishing-related injuries to migratory seabird populations reach far beyond impacts to just adults, but also unfledged chicks, particularly during breeding season. However, DEIS does not present data or discuss adverse population effects. Recommend revised DEIS estimate population effects of killing adult migratory birds during breeding season and incorporate these estimates into total mortality estimates, particularly for black-footed and Laysan albatross.	Potential population effects of killing adult breeding albatross are discussed in the FEIS. There are insufficient data to provide a quantitative estimate of this effect.
P111aaa	written - P S Port	p3-122(a), Para 3, sent 4: Recommend adding these comments to this paragraph: Another poorly understood impact is effect of harvest-related reduction of biomass of large pelagic fish on seabirds that are obligate commensal of these fish. Almost all species of seabirds in tropics relay on large fish to aggregate prey and force it to surface where it will be available to them. Reductions in large fish populations affect prey availability to birds.	This discussion has been included in the FEIS.
P111bbb	written - P S Port	Pg 3-137(a), 3.9.7, para 3, sent 5: Recommend inserting following sentence after...affect seabirds. "Oil contamination affects seabirds directly and immediately by destroying waterproof nature of their plumage and disrupting thermoregulation & buoyancy."	This has been inserted.
P111ccc	written - P S Port	p3-137(a) Para 4, sent 1: DEIS states "The effects of ingested plastic on growth and survival of Laysan and black-footed albatross chicks were studied by Sivert & Sileo." Please note the genus for both species of albatross is *Phoebastria*.	Text has been changed.

Tracking No.	Commenter	Comment	Response
P111ddd	written - P S Port	Pg 3-138(a), 3.9.7, para 2, sent 2: DEIS states "A point source of contaminants (PCBs leaking from discarded generators) on Tern Island was identified as potential threat to monk seals and other components of ecosystem at French Frigate Shoals." We are concerned only one location in Hawaiian archipelago was analyzed for potential contaminant impacts to Hawaiian monk seals. Recommend revised DEIS examine other locations for potential contaminant impacts to Hawaiian monk seals which should include Niihau, Kauai, Oahu, Maui, Molokai, Lanai, Hawaii & other locations in northwestern Hawaiian islands.	The paragraph has been re-written to reflect the possibility that other such sites in the Hawaiian Islands may exist.
P111eee	written - P S Port	Pg 3-82, tbl 3.10.2-OV2: DEIS states in table that "P. alatus (2 reported sightings, no encounters)." Recommend this statement be amended to read "no reported encounters" given the low observer effort dedicated by NMFS for observing seabird interactions when longline gear is set.	All sighting information has been removed from the table. Information on longline encounters is found in Section 3.10.3.1.5.
P111fff	written - P S Port	Pg 3-86, fig 3.10.2-OV3: Illustrates nearshore closed areas, Hawaiian waters, three-mile State waters and EEZ. However, figure does not illustrate marine boundaries for NWRs that occur in this region. Recommend you identify marine boundaries for Midway Atoll NWR, Hawaiian Islands NWR, Johnston Atoll NWR, Baker Island NWR, Howland Island NWR, Jarvis Island NWR, Kingman Reef NWR & Palmyra Atoll NWR in this figure.	Unfortunately, at the small scale of the map, the boundaries in question will not show up.
P111ggg	written - P S Port	Pg 3-120; 3.10.2.4, para 1: DEIS states "This section of DEIS summarizes important issues involved with estimating economic value of turtles, albatross and other species and resources that may be affected by fisheries managed under western Pacific Pelagics FMP." Recommend revised DEIS include discussion of economic value of fish and wildlife resources are described in this document. We feel this discussion should provide same level of detail as is provided in describing the economic value of U.S. pelagic fishing industry.	Background information is both provided in summary form and incorporated by reference. Estimates of non-market value of resources are not currently available and the process of discovering these values is time-consuming, expensive, and beyond the scope of this document.
P111hh	written - P S Port	Department of Interior believes the deficiencies in DEIS preclude its use as basis for meaningful analysis of anticipated project-related impacts to certain fish/wildlife resources and that release of DEIS was premature. Recommend be revised with more complete information, improved analyses of alternatives and potential impacts, clearer commitment to avoid unnecessary impacts, minimize unavoidable impacts, compensate for significant unavoidable impacts. Look forward to working with Department of Commerce to provide data, analyses, reports that would bolster revised DEIS for future review process.	EIS uses best available data to present a range of alternatives and a Preferred Alternative identified in the Final EIS as Alternative 10.

Tracking No.	Commenter	Comment	Response
P112a	written - Roy Yamaguchi (Reid Dist.)	I am writing you to urge you to reconsider your preferred option of closing longline fishing to Hawaii boats only during the months of April and May.	The new preferred alternative, Alternative 10, would permit year-round fishing by the tuna segment of the fishery.
P112b	written - R Yamaguchi	There is not enough factual statistics to fault Hawaii's longline tuna boats and subject them to this extreme judgement to cease fishing for two months. Instead, why isn't more time being considered to collect facts through observation before this sort of extreme is taken? Aren't the measures being adhered to presently by Hawaii's swordfish boats enough to eliminate the majority of turtle mortalities so studies can be made?	The new preferred alternative would permit year-round fishing by the tuna segment of the fishery. Option A would allow controlled swordfish fishing while data on the effectiveness of turtle interaction deterrents are gathered.
P112c	written - Roy Yamaguchi	This action would cause a devastating financial burden on my business, being that 98 percent of my ahi is caught by longline tuna boats. My business would not be able to survive a two-month closing. I have just invested a huge sum of my savings in a new facility to meet FDA requirements.	The new preferred alternative, Alternative 10, would permit year-round fishing by the tuna segment of the fishery.

APPENDIX T

Distribution List for the Final Environmental Impact Statement on the Pelagic Fisheries of the Western Pacific Region.

DISTRIBUTION LIST
for Final Environmental Impact Statement on the Pelagic Fisheries of the Western Pacific Region

Last Name	First Name	Company
		Amak River Legacy F/V LEGACY
		Amko Fishing Co, Inc F/V DEBORAH ANN
		Aukai Fishing Co. Ltd F/V KILAUEA
		Awahnee Oceanics Inc F/V KINUE KAI
		Byshore Mgmt Inc F/V SWELL RIDER
		Capt. Diamond Inc F/V CAPT. DIAMOND
		Chuna Inc F/V DAEINHO II
		Cori Dawn Corp F/V CORI DAWN
		Davis B Inc F/V CRYSTAL
		DongWong Marine Inc F/V PAN AM II
		Duksung Fishing Inc F/V DASHER II
		F/V VIRGINIA CREEPER
		Fishrite Inc F/V PACIFIC FIN
		Guam National Wildlife Refuge
		Gunn Pacific Reflection F/V PACIFIC REFLECTION
		H&M Marina Inc F/V HEOLA
		Hanson/Hanson Fishing Co F/V SEASPRAY
		Hawaii DL&NR
		Hawaii Fishing Co F/V SEA HAWK
		Hawaiian Islands Humpback Whale Sanctuary attn: Sanctuary Manager

Last Name	First Name	Company
		Honolulu Star Bulletin
		House Resources Subcommittee on Fisheries Conservation, Wildlife and Oceans
		House Resources Subcommittee on Fisheries Conservation, Wildlife and Oceans
		Jackson Bay Co. F/V PACIFICA
		Jong IK Fishing Co. Inc F/V LADY CHUL
		Ka'upu Ltd F/V PETITE ONE
		Kaloke Ana Fishing Inc F/V KALOKE ANA
		Kan-Do Pesca Inc F/V CHRIS
		Katrinna Pacific Corp F/V PARADISE QUEEN III
		Kema Sue Inc. F/V KEMA SUE
		Kim Thanh I Inc F/V KIM THANH I
		KMC & PCC Inc. F/V MAN SEOK
		Konam Fishing Co, Inc F/V GARDEN SUN
		KuKu Fishing Inc F/V KUKUS
		Kwang Myong Co Inc F/V SEVEN STARS
		KY Fishing Inc F/V KAY
		L&T Fishery F/V CAPT.LE
		Lady Ann Margeret Inc. F/V LADY ANN MARGARET
		Lyons, Brandt, Cook & Hiramatsu Attn G Brandt & S Otaguro
		M/V Piky Inc F/V PIKY
		Martin Noel, Inc F/V IMMIGRANT
		Miss Lisa Inc F/V MISS LISA

Last Name	First Name	Company
		MS Honolulu F/V LEA LEA
		MTA Corp F/V ANNA
		N Pacific Fishery Inc F/V PACIFIC STAR
		Natali Fishing Inc F/V HANNAH LEE
		NMFS Sustainable Fisheries Division
		NMFS Alaska Regional Office attn: Kim Rivera
		Ocean Diamond Inc. F/V OCEAN DIAMOND
		Office of Rep. Abercrombie attn: Tom Wanley
		Office of Rep. Mink attn: Anne Stewart
		Office of Senator Akaka attn: Shirley Fisk
		Office of Seantor Inouye attn: Margaret Cummisky
		Office of Hawaiian Affairs
		Pacific Fisheries Corp F/V ICY POINT
		Pacific Fishing & Supply
		Pacific Seafoods Inc F/V PACIFIC DREAM
		Paik Fishing Inc. F/V KOLEA
		Palmer Pederson Fisheries F/V MISS JANE
		Princess K Fishing Corp F/V PRINCESS K
		Robin Fishing Inc F/V ROBIN II
		Royal Order of Kamehameha
		Sant Maria III Inc F/V QUEEN DIAMOND
		Sea Moon II Inc F/V SEA MOON II
		Sea Dragon II Inc F/V SEA DRAGON II

Last Name	First Name	Company
		Sea Spray LLC F/V SEA SPRAY
		Senate Commerce Subcommittee on Oceans and Fisheries
		Senate Commerce Subcommittee on Oceans and Fisheries
		Sierra Fisheries Inc F/V WONIYA
		Song Fishing Corp F/V KATHERINE Y
		Stoel Rives LLP attn: JW Leppo and JM Lynch
		Success Inc. F/V BRANDI
		Sylvan Seafoods Inc
		Two Bulls Inc. F/V MANA LOA
		Ulheelani Corp F/V ULHEELANI
		United States Tuna Foundation
		United States EPA - Region I attn: Laura Fujii
		US Fish and Wildlife Service Attn: Paul Henson, Ph.D.
		Viking V Inc F/V MARINE STAR
		White Inc F/V HOKUAO
		Yu & AAS Corp F/V LIBERTY
Aasted	Don	F/V RED BARRON
Aasted	Donald	F/V RED BARRON
Aila	William	
Anderson	James	
Andrews	Russel	Univ. of British Columbia Dept. of Zoology
Andrews	Dr. Russel	University of British Columbia Dept. of Zoology
Artero	Victor	
Atchitoff	Paul	Earthjustice Legal Defense Fund
Barefoot	Jordon	
Basargin	Natalia/Kiril	F/V WHITE NIGHT

Last Name	First Name	Company
Bator	Bonnie	
Beals	Gary	
Beebe	Bill	
Bigelow	Keith	Oceanic Fisheries Programme Secretariat of the Pacific Community
Blaine	Davis	Office of Planning - DBEBT
Boggs	Chris	NMFS Honolulu Lab
Borresen	Yvonne	Defenders of Wildlife
Brackford	William	
Brock	Dr Richard	University of Hawaii Sea Grant
Burney	David	USTF
Callaghan	Dr Paul	University of Guam
Camacho	Claudine	
Camhi	Merry	
Carlisle	Cynthia	
Carvalho	Clayton	
Chapman	Gordon	
Cook President	James	Pacific Ocean Producers
Crain	Ed	
Crowder Professor	Larry	Duke University Marine Laboratory Nicholas School of the Environment
Cruz	Alfanacio	
Cummings	Brendon	
Dalzell	Paul	PRFMC
Dang	Minh	
Daxboeck	Dr Charles	
DeCosta	Gilbert	F/V PEARL HARBOR II
Dela Cruz	Warren	
Denolfo	Louie	
Deriso	Dr Richard	Tuna-Billfish Program Inter-American Tropical Tuna Commission
Dewenter	David	
Do	Quan	F/V KINGFISHER & MISS JULIE
Duenas	Chris	
Duenas II	Manuel P	Guam Fishermen's Cooperative
Eckert Senior Research Biologist	Scott	Hubbs-Sea World Research Institute

Last Name	First Name	Company
Engebretson	Monica	
Epps	John	
Evans	Dave	Dept of Marine and Wildlife Resources
Fanulovich	Tony/Lorna	F/V ST MICHAEL
Farm Director	Frank	Hyperbaric Treatment Ctr
Feder	Judson	NOAA Southwest Office of General Counsel
Fithian	Peter	
Flournoy	Peter	International Law Offices of San Diego
Friesma	Paul	Environmental Policy Program
Furuno	Alan	Congressman Ambercrombie's Office
Gaffney	Rick	
Gales	Dr. Rosemary	Nature Conservation Branch, DPIWE
Gallimore	Richard	
Gibbons-Fly	Bill	US Department of State
Gibbs	John	F/V PACIFIC HORIZON
Gillman	Eric	
Glazier	Ed	
Grasso	Tom	World Wildlife Fund
Guthertz	Dr Judith	UOG, College of Business & Public Administration
Gutierrez	Jay	Guam Division of Aquatic and Wildlife Resources
Hale	Tim	
Hale	Kim	
Haleck	Stephen	
Hampton	Dr W John	South Pacific Commission
Harp	Issac	
Harris	Dot	Dept of Commerce, Gov of Guam
Hegushi	Wayne	United Fishing Agency
Heikkila	Wayne	
Heppell NHEERL Postdoctoral Fellow	Selina	US Environmental Protection Agency NHEERL Western Ecology Division
Ho	Brian	F/V PACIFIC PRIDE
Hoang	Anthony	US Dept of Justice
Hoang	Dennis	High-Sea Hawaii Fishing Supply
House	Mike	
Hubberd	Lela M.	

Last Name	First Name	Company
Ikehara	Walter	Hawaii Division of Aquatic Resources
Itibus	Pedro	
Ito	Russell	NMFS Honolulu Lab
Jacobs	Lyn	US Dept of Justice
Janisse	Chuck	
Jessop	Aaron	
Jones	Andrew	
Kajihiro	Kyle	
Kasaoka	Gary	
Kelly	Marion	
Kelly	David	F/V ARROW
Kelly	Kevin	WPRFMC
Kim	Kyong Dok	F/V SKY SUN
King	William	
Kleiber	Dr Pierre	NMFS Honolulu Lab
Knutsen	Kristofer	F/V ALEUTIAN SPRAY
Kusano	Jean	UH-Hamilton Library Gifts and Exchange Dept.
LaGrange	John	
Laurs Director	Michael	NMFS Honolulu Lab
Lee	Samuel	F/V LILA
Lee	Nga Van	F/V CAPTAIN MILLIONS III
Leonne	Dianne	
Lieberman	Derek	
Lindenbaum	Terry	
Lindgren	Peter	Lindgren-Pitman Inc.
Lujan	Isabel	Department of Commerce
Lutu	Afoa	Tautai O Samoa Fishing Association
Lynch	James	Stoel Rives, LLP
Mafnas	Ramon	
Martin	Sean	Pacific Ocean Producers
Masga	Floyd	Department of Natural Resources Division of Fish and Wildlife
Maxwell	Charles	
McAbee	Keith	
McCoy	Frank	Harbor Refuse & Environmental Services, Inc.
McHale	Tana	

Last Name	First Name	Company
Medeiros	Frank	
Meeker Assistant United States Attorney	Theodore	US Dept of Justice
Miles	Jason	
Mitchell	Elizabeth	
Moon	Kil Cho	F/V JENNIFER
Morioka	Roy	NORTEL
Mossman	William	
Myking	John	
Nelson	Michael E.	
Nguyen	Nancy	F/V SEA DIAMOND
Nguyen	Reagan	F/V QUYNH VY
Nguyen	Hoang Nan	F/V INDEPENDENCE
Nguyen	Xuan	F/V RED DIAMOND
Nguyen	Scott	F/V KING DIAMOND II
Nicholls	D.G.	Chisholm Institute
O Puna	Malama	
O'Brien	Marie-Teresa	University of Guam
Ojini	Ray	
Oliver	Chuck	SWFSC
Oshiro	Ryan	
Otaguro	Steven	Lyons, Brandt, Cook & Hiramatsu
Pai	Mahealani	
Pangelinan	Benny	BKP & Associates EIA Consulting
Parrish	Dr James	Hawaii Coop. Fishery Research Unit University of Hawaii
Paul	Linda	
Pelora	Sean	
Plummer	Pete	
Pooley	Dr Sam	NMFS Honolulu Lab
Pride	Christopher	
Quitigia	Raymond	
Reyz	Jesse	
Rezentes	Cynthia	
Sarba	Frank	
Schroeder	Tom	JIMAR University of Hawaii

Last Name	First Name	Company
Seaton Trustee	Paul	F/V SEA SPIDER
Seman	Richard	Division of Fish & Wildlife
Severance	Dr Craig	Department of Anthropology University of Hawaii
Sibert	Dr John	Manager JIMAR, Univ. of Hawaii Pelagic Fisheries Research Program
Silva	David	
Simonds	Kitty	PRFMC
Skillman	Dr Robert	NMFS Honolulu Lab
Spotila Professor	James	Drexel University School of Environmental Science, Engineering and Policy (SESEP) Center for Biodiversity and Conservation
Spotts	Richard	
Steiner	Todd	Sea Turtle Restoration Project
Steiner	Todd	Dana Inn and Marina
Stimson	John	University of Hawaii Department of Zoology
Stone	Richard B.	
Sunia	Aitofele	
Taman	Jerry	
Tamashiro	Richard	
Teina	Edward	
Tenorio	Dr Joaquin	Department of Natural Resources
Terlajea	Anthony	
Thompson	Ricardo	
Timoney	Timm	
Timoney	Timm	
Torett	Paul	
Tran	Kim	F/V KIMMY I
Tran LLC	Kevin	F/V CAPT. KEVIN
Trianni	Mike	Department of Natural Resources Division of Fish & Wildlife
Tulafono Director	Raymond	DMWR-American Samoa Govt
Tummons	Patricia	
Vawter	William	
Vincent	Phil	F/V Tucana
Walsten	Arlin	

Last Name	First Name	Company
Wanger	Jolie	University of HI, Manoa
Watson	Ellen	
Weaver	Gene	
Webster	Thomas	F/V HAVANA
Witbeck Sr	Allen C	F/V RUBY STORM
Yamasaki	Gordon	National Marine Fisheries
Yi	Roy	F/V GLORY